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● Road Relocation

See page 2.

● Concreting Methods

See page 2.

● Hydraulic Fill for Highway

See page 7.

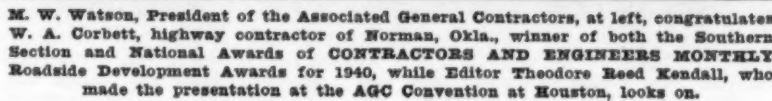
● Jersey Route Widened

See page 11.

● Effective Ice Control

See page 20

ROADSIDE DEVELOPMENT AWARD WINNER FOR 1940



Extension of Route 63 Will Serve as Wide Link in an Important Road Running South from Vermont Line

(Photo on page 56)

★ **ACCENTUATING** the usual care in the construction of bituminous penetration macadam pavements in Massachusetts, the Kelleher Corp. of Turners Falls, Mass., built a new section of Mass. 63, FAP 314-E (1), 2.14 miles in length through the town of Leverett, Mass., in the summer of 1940. Heavy grading, two complete surface and subsurface drainage systems, and considerable roadside development were other features of the \$104,575.75 contract.

Heavy Grading

The first heavy grading started about 2,650 feet from the north end of the

project where 20,000 cubic yards of somewhat shattered hard rock was removed in a distance of 1,200 feet. From this the work ran directly into fill 1,080 feet in length and 30 feet high in which rock from both ends, where heavy cuts occurred, was used in the fill, with particular care being taken to see that the fine material went onto the slopes. This 36,000-cubic yard fill runs out at the south end into a ledge of "puddingstone" conglomerate.

About 2,100 feet south of the long fill there was a break in the present contract where a railroad overpass is to be built. A temporary approach was built through this section for a distance of 1,800 feet. South of this, for a distance of 4,300 feet, the project continued with only light grading for the macadam surface.

Drainage

A very complete surface and subsur-
(Continued on page 42)

♦ **WITH** all-out defense, as quickly as possible, this country's great objective, it is obvious that the efforts and energies of practically every one of our 130,000,000 people will be directed, in one way or another, to that end. In this total defense program, roads and road builders will make a great contribution and have a great responsibility, for in the last analysis, tanks and guns and supplies are of no use unless they are *where* they are needed *when* they are needed.

In the January issue of **CONTRACTORS AND ENGINEERS MONTHLY**, we published an article on National Defense and the part the construction industry will play in achieving it. A large part of that article was devoted to highways' place in the total-defense picture. Continuing our efforts to depict the present status of highways, particularly those included in the strategic network of 75,000 miles as designated by the War Department, we have made a survey of the present condition of that mileage, by states, so that we might present to our readers at least an estimate of the amount of work necessary to bring that network up to minimum standards.

Military Transport

Just what are the requirements for highways for military transport? Such roads must be able to handle military traffic, including tanks, big guns, troops,

(Continued on page 16)



A truck with oiled tires and a Burch disk spreader applying trap-rock chips over penetrated top stone on the Kelleher contract on Mass. 63.

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MARYLAND RELOCATION

Grading and Structures On Road Relocation Which Improves Strategic Route Through Maryland

By EDWARD H. NUNN, Construction Engineer, Maryland State Roads Commission

† THE grading, drainage and paving of the 19.68-mile section relocating U. S. 40 in Maryland between Baltimore and the Delaware state line, a description of which project appeared in CONTRACTORS AND ENGINEERS MONTHLY, January, 1941, page 24, was divided into fourteen contracts in order to permit sufficient time for fill settlement in certain of the graded sections prior to paving, to build the bridges over Elk River, and have the entire highway built and ready for traffic on the same date as the completion of the Susquehanna Bridge (CONTRACTORS AND ENGINEERS MONTHLY, February, 1941, page 15).

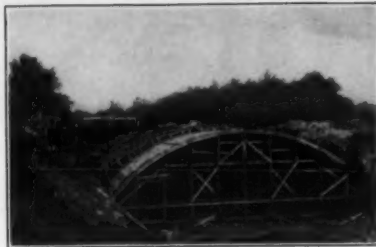
Unfortunately, right-of-way difficulties combined with the worst construction weather encountered in many years prevented completion at that date. The first contract, Ce-186, was started on May 29, 1939, and the roadway was opened to traffic its entire length by January 1, 1941.

Structures on the Route

In addition to the 7,613-foot bridge over the Susquehanna River, described in a previous issue, there are a number of other structures included in the project.

The grade elimination at Red Mill (Contract Ce-185) over the tracks of the Pennsylvania Railroad utilizes the existing overhead bridge for the westbound drive of the highway. The new structure for the eastbound drive consists of concrete abutments and piers supporting four simple beams. The spans are 59 feet 5 inches, 70 feet 2 7/8 inches, 72 feet 9 3/8 inches, and 56 feet 10 1/2 inches. The exterior girders are 36-inch I-beams varying from 182 to 300 pounds per foot, while the interior girders are 33-inch I-beams from 125 to 220 pounds. Thirty-two feet of clear roadway is carried on a concrete deck covered with a 1 1/2-inch bituminous wearing surface. In addition, there are two 3-foot clear sidewalks.

Two identical bridges, each carrying a drive of the dual highway over Little Elk Creek and consisting of two units each of three continuous spans, making six spans in each structure, were in-



C. & E. M. Photo
Centering for the 60-foot arch of the new bridge over Principio Creek on the relocation of U. S. 40 between Elkton and Havre de Grace, Md.

cluded in Contract Ce-185. The spans of each unit are 49 feet 4 1/2 inches, 50 feet, and 49 feet 4 1/2 inches. The exterior girders are 30-inch I-beams of 124 pounds per foot and the interior girders are 30-inch 108-pound I-beams. The design called for the formation of the approach fill, driving hollow-shell steel piles through the newly made fill to a penetration of 10 feet into the old ground giving a 45-ton bearing. The shells were then filled with concrete and a concrete cap placed over the pile heads to form an abutment which was 3 feet in height from 6 inches below the pile head to the bridge seat. The piers were founded on untreated timber piles driven to 20-ton bearing. This substructure supports a 32-foot clear roadway and two 3-foot sidewalks. A concrete balustrade was constructed at the back of each sidewalk.

The Elk River, south of Elkton, is crossed by two identical bridges, Contract Ce-216. These are continuous

(Continued on page 27)

New Arch Bridge Carries "40" Over Principio Creek, Part of Relocation Project Completed in 1940

† AMONG the many interesting contracts completed during the 1940 construction season between Havre de Grace and Elkton, Md., relocating U. S. 40 and doing away with the old narrow winding roadway, was FAP 450-1 (1) (Ce-222) awarded to C. J. Langenfelter & Son of Baltimore, Md., on its low bid of \$160,940.85 for 1.383 miles of grading, concrete surfacing and a concrete arch bridge over Principio Creek. The new highway consists of a 24-foot concrete roadway in each direction separated by 38 feet of boulevard strip. This roadway is carried by the new bridge on 8 feet of fill so that the structure will be scarcely noted by travelers of 1941 and years to come; however its design and construction are a credit to the engineers and contractors.

The bridge has a 60-foot span with a 15-foot rise from the spring line and is 130 feet wide. The arch is 2 feet 9 inches thick at the spring line and 1 foot 3 inches at the crown. After the footings were completed the arch was poured as six 21-foot 8-inch sections.

Excavation

The new bridge is located in a channel change, straightening Principio Creek and involving excavation in ledge about 23 feet deep. The old stream bed which goes in a semi-circle around the new bridge was filled to an elevation 7 feet



C. & E. M. Photo
A close-up of the form work at the east end of Principio Creek arch bridge, showing the posts and bracing.

above the new stream location at the bridge. Where the new road crosses the old stream bed there is a fill of earth and rock 22 feet high. The rock excavation for the footing was carried down from 2 feet above to 7 feet below stream bed to solid rock. Apparently this site at one time had been the tailrace of a mill, because in the center of the excavation mud holes were found which necessitated filling with rock before the tractors and shovels could operate safely.

About two months was required for the rock excavation because of the unusually hard character of the rock and the difficulty of access to the work. An Ingersoll-Rand diesel compressor furnished the air for two Ingersoll-Rand wagon drills and the blasting was done with Atlas 40 and 60 per cent dynamite in the deep holes. A pair of Lorain 75 shovels loaded out the excavation which was hauled around and used to start the fill which restricted the area of the old stream bed. The stream was turned into the new channel on August 25, so that the high fill in the old channel could be continued as this proved to be the bottleneck of the grading operations. The specifications required all excavation in earth to be on a 2 to 1 slope, and in rock on 1 to 1 along the stream change north and south of the bridge.

The southeast wing wall of the bridge is the only part of the structure which is not on solid rock and that is carried on compacted sand and gravel. The plans showed rock 2 feet higher than the footing elevation on the southeast wing. This was probably due to the fact that the borings taken at this point struck the large boulders which had accumulated at this point and it was assumed that they represented ledge.

Forms and Reinforcing

The posts for carrying the forms were 6 x 6 timber placed on 6-foot centers across the arch and on 7-foot centers

(Concluded on page 19)

Methods of Lining Delaware Aqueduct

Concrete Placement with Pneumatic Equipment and Pumps on 117-Mile Line for New York City

(Photos on page 56)

† ABOUT 2,650,000 cubic yards of concrete will be required to line the 85 miles of Delaware Aqueduct now under construction, part of a \$298,000,000 project to increase New York City's water supply. Working under a rapid construc-

tion schedule and under difficulties of getting concrete from the surface into the tunnel and along it to the forms, the eight contractors who are now placing tunnel lining have developed interesting and different methods of mixing, transporting and placing this concrete lining.

As described in a preceding article (C. & E. M., December, 1940, page 1), the usual practice is first to build concrete curb walls in hand-mucked trenches on each side of the invert. These curb walls support both the radial side forms for the invert and the rails on which run the traveling bridges carrying the concrete pump pipe or blow pipe or tracks for concrete cars for concreting the invert, and in some cases the mixer and concrete pump or gun and other concreting equipment. The invert is poured next, and then the side wall and arch in one operation.

On some contracts the concrete is mixed at the shaft head, dropped through pipes to hoppers at the bottom of the shaft, with drops up to 1,000 feet or more, and transported to the work in agitator cars. On other contracts, the dry batch is dropped through pipes, moved in batch boxes or cars, the cement being kept separate from the damp aggregate, and mixed in the tunnel at the point of placing. Modifications of this general procedure are described under the several contracts.

Pumping Concrete

Walsh Construction Co., of Davenport, Iowa, contractor for 9 miles of 13.5-foot tunnel, is one of the firms selecting the Pumperete method of concrete placing. From the Blaw-Knox batching plant at the shaft head, the cement and aggregate are dropped down the shaft through a 6-inch and a 10-inch

(Continued on page 30)

CONTRACTS AWARDED FOR RELOCATION OF U. S. 40 IN MARYLAND				
Contract	Contractor	Description	Length	Total Bid
Ce-186	J. H. Ensey	Grading, drainage & paving.....	2.41 mi.	\$127,058.05
Ce-200	A. V. Williams	Grading & drainage.....	4.04 "	155,838.75
Ce-209	Waller Paving Co.	Grading & drainage.....	5.02 "	233,784.50
Ce-215	George & Lynch	Grading & drainage.....	0.546 "	92,560.10
Ce-216	A. S. Wikstrom	Dual bridge.....	800 ft.	221,780.90
H-218	Waller Paving Co.	Grading, drainage & paving.....	1.484 mi.	174,963.25
Ce-214	C. J. Langenfelter & Son	Grading, drainage & paving.....	1.854 "	207,806.24
Ce-222	C. J. Langenfelter & Son	Grading, drainage & paving including arch bridge.....	1.383 "	160,940.85
Ce-208-1	McHugh Bros.	Paving.....	2.222 "	196,211.45
Ce-208-2	M. J. Grove Lime Co.	Paving.....	1.818 "	156,208.95
Ce-209-1	Phillips Bros.	Paving.....	2.477 "	202,475.35
Ce-209-3	Phillips Bros.	Paving.....	2.443 "	188,406.40
Ce-185	C. J. Langenfelter & Son	Grading, drainage & paving, and three bridges.....	0.847 "	386,705.85
Ce-215-1	Old Line Constr. Co.	Paving.....	0.346 "	48,011.75



Elk River Bridge on U. S. Maryland Route 40, recently relocated, showing on the right the swamp area where pulp mill waste had been dumped.



On the Frazier-Davis Construction Co. Aqueduct contract, the side wall and arch lining were poured before the invert. The form is shown pulled away from the lining, to be moved ahead.

SERVICE THAT KEEPS ASPHALT ROAD JOBS MOVING

on schedule!



The plant of the Windsor Service Company, Road Contractors of Reading, Pa.

The road or street job is ready for asphalt. Out on the contractor's siding sit one or more tank cars of Texaco, waiting to be unloaded.

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Chicago Houston Jacksonville Philadelphia Richmond Boston

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING
CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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Peace-Time Construction Aids Defense

The part which peace-time construction is playing in our defense program was fully demonstrated by speakers at the Twenty-Second Annual Convention of the Associated General Contractors of America in Houston, Texas, last month.

First, the magnificent organization of the constructors of America has been able to swing into defense construction with remarkably little adjustment, and they have been able to expand their organizations rapidly to take care of the larger permanent and semi-permanent construction demanded by the armed forces of this country.

W. D. Dean, Manager of the Bureau of Contract Information, pointed out that it was the integrity and known competence of the contracting organizations in the construction industry which has made possible the award of negotiated contracts with fixed fees by the Construction Division of the Office of the Quartermaster General, War Department. He stated that, no matter how carefully negotiated contracts are drawn up, there will inevitably be investigations by Congress later, and that the completeness of the records of the contractor's past work, included as a part of the contracts, would enable him to prove the honesty of the negotiation and leave him a continued clean slate.

Much has been said about the rapid increase in defense contracts and also concerning the reductions which will be necessary in so-called peace-time public works. The President of the United States has called for a cessation of as large a portion of this type of work as possible, but has asked for a liberal appropriation for the preparation of plans for future public works which may be established as a reservoir for operations when the intensive activities of the defense program are slackened after the emergency has ended.

There are, however, certain peace-time construction projects which still have great national-defense value and must not be halted. These include all river and harbor projects which would serve navy yards, and today projects of this type are going forward at 24 different locations under appropriations amounting to \$55,000,000. Such work is of great value in the Great Lakes to insure the continuity of ore and steel shipments during the months when the lakes and harbors are not frozen over, and for the great industrial areas in the middle west served by the Ohio River where river transportation, slow as it is, is still sufficiently rapid and economical for emergency needs.

In his able presentation of the national defense program before the Convention, Major-General Julian L. Schley, Chief of Engineers, United States Army, pointed out that if the war continues, other so-called peace-time projects of great national-defense value undoubted-

ly will be authorized, as most of them can not be completed overnight. The long-range program of flood control is already proving its value in the protection of many of the important industrial centers along the Ohio and Mississippi Rivers, where the production of munitions and supplies is continuing at an increasing tempo with the assurance that it will not be checked by spring floods in 1941. Gen. Schley also pointed out that river and harbor and flood-control appropriations may be reduced during the emergency, but the funds for maintenance will not be reduced unless the emergency lasts for many years. The budget for the fiscal year ending June 30, 1942, calls for \$30,000,000 of funds for new work and \$43,000,000 for maintenance, this representing only a small reduction over past years. There is an item of \$70,000,000 for continued flood control. The total budget asked is \$164,213,000 for so-called peace-time operations, as compared to \$282,000,000 for the last fiscal year.

We salute the Engineer Corps of the United States Army and its able civilian staff for the program of flood control and general river and harbor improvement which it has continued year after year and which is now proving its great value during a period of national emergency.

Roadside Development Awards for This Year

Although CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards for 1940 were awarded only last month at the Associated General Contractors Convention in Houston, Texas, it is not too early to start thinking about this year's Awards, as "before" and "after" photos, showing work going on, as well as "after" photos, are an important part of the data on which the judges base their decision.

These Awards are made annually to the highway contractors or their superintendents making the greatest contribution to roadside development in the four sections of the country, North Atlantic, Southern, Central and Western, and to one of the Section Award winners goes also the National Award for the greatest contribution to roadside development in the United States during the current year.

The type of contribution made by a contractor may be the development of special tools or equipment which facilitate the work, produce better results or make for greater economy in the conduct of the work, either present or future; care in the preservation of existing trees and shrubs along the roadside which otherwise would be destroyed during the course of the work; extra work without compensation, such as dressing roadside borrow pits, in order to leave a better looking job; suggestions for handling the work which make a definite contribution to roadside development; and unusual cooperation with the state highway department engineers.

Nominations for the Awards are made by the state highway departments and should include a brief description of the project, a detailed description of the work done by the contractor and evidence of his unusual cooperation or other contribution to roadside development, with photographs, sketches and blue prints to illustrate these points. Concrete evidence of the contractor's or superintendent's contribution is extremely important; otherwise a contractor whose work is worthy of an Award might not receive it simply because insufficient details and evidence were presented to the judges.

The Awards themselves consist of mahogany plaques with suitably inscribed silver plates for the Section



Awards, a sterling silver loving cup for the National Award, and engrossed certificates for Honorable Mention. To the state highway departments nominating winners, engrossed certificates are also presented.

With the increased realization of the importance of roadside development and the prospective highway work ahead, we anticipate an even greater number of nominations for the Roadside Development Awards for 1941, and hope that every state in the Union will be represented in this year's nominations.

Superintendents Needed For Defense Construction

An examination has been announced by the U. S. Civil Service Commission to secure superintendents of general construction for work in the national defense program. Broad and responsible experience is required, and qualified persons are urged to file their applications at the Commission's Washington office where they will be rated as received until December 31, 1941.

There are several grades of positions with salaries ranging from \$3,200 to \$5,600 a year, less 3½ per cent retirement deduction. In general, the duties involve the direction of foremen, laborers, and mechanics on large construction projects. Applicants must have had progressive experience in the field of general construction, part of it having been on large projects involving excavation, reinforced concrete, steel, wood, and masonry, and supervision of three or more foremen of different building or construction trades. Engineering courses completed at a college or technical institute may be substituted for part of the general experience.

Further information and application forms may be obtained from the Secretary of the Board of the U. S. Civil Service Examiners at any first or second-class post office, or from the U. S. Civil Service Commission, Washington, D. C.

Many States Consider Anti-Diversion Bills

A nation-wide survey just concluded by the American Automobile Association shows that the legislatures of more than twenty states will have before them at the current sessions proposals for constitutional amendments to prevent future use of motor vehicle tax revenue for anything but road purposes.

The sweeping character of the movement was ascribed by Thomas P. Henry, President of the AAA, to two things: first, the large popular majorities by which similar amendments were adopted in several states in the last general election; and second, the growing public understanding of the importance of adequate highways as an integral part of the national defense program.

Mr. Henry said, "With the road funds of eleven states already protected from raids by constitutional amendments and with more than twenty states considering such amendments at the present time, it looks as though the motorists of the country are finally on the march."

THE WRONG GIRL



"You stay home, Cinderella—he's spending it on me!"

Booklet on Batchers for Truck-Mixed Concrete

One of the essentials for the successful operation of any job using truck-mixed concrete is dependable accurate batching at the batching plant. Of interest to contractors as well as to operators of ready-mixed concrete plants is the new 16-page well-illustrated booklet on truck-mixer charging plants just issued by the Heltzel Steel & Iron Co., Warren, Ohio.

A complete line of Heltzel batching equipment for charging truck mixers, including portable bins, bulk cement tanks, portable and semi-portable bulk-cement plants, enclosed bucket elevators, and belt conveyors, is described and illustrated with photographs and dia-

grams. Specifications for plant assemblies are given for various types of jobs. Copies of this Bulletin B-31 may be secured by those interested direct from the manufacturer by mentioning this magazine.

Macatee Promoted

The Board of Directors of The Asphalt Institute has announced the appointment of W. R. Macatee to the newly created post of Assistant Managing Director. Macatee has been serving as District Engineer in Washington, D. C., where he has coordinated the Institute's work with national defense measures, particularly in the airport construction program. He will continue in charge of the Washington Office of the Institute.

1941 Pumpcrete Catalog

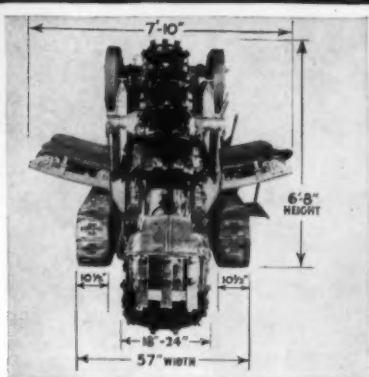
A new 24-page catalog describing the 1941 models of Pumpcrete, the pump which pumps concrete, has recently been issued by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis. These new models are now equipped with a 3-way selective drive in the double-cylinder units. This feature enables the operator to pump through both cylinders simultaneously to gain full pumping capacity or to shut down either side of the pump without interfering with the continuous flow of concrete from the other cylinder. Where two points are being poured simultaneously, the 3-way selective drive allows the operator to slow up the flow of concrete in either pipe line to regulate the rate of pour.

Copies of this new catalog, which contains information on pipe-line handling and on the types of jobs to which Pumpcrete is especially adapted, as well as complete specifications and dimensions for the machines themselves, may be secured direct from the manufacturer.

Hercules Motors Expands

Because of increased business, the Hercules Motors Corp., Canton, Ohio, has purchased a 4-story factory building on property adjoining the Hercules plant. Work of reconditioning the factory to accommodate expanding production requirements of the Hercules company has already begun and it is expected that it will be in service by April 1.

BUCKEYE ✓ 410 DIGS TRENCH ON DEFENSE PROJECTS *Faster and Cheaper*



—and with more profit for the contractor!

Buckeye 410's are doing a whirlwind trenching job on Uncle Sam's army camps, airports and emergency industrial and housing construction projects. Trenching that so often lags on such projects keeps right up with or ahead of other work when a 410 is on the job.

The small, compact 410 is a fast trencher for sewer, water and gas pipe and drainage tile. It makes trench up to 2' wide and 6' deep (7'6" optional equipment). It's light on its feet, easy on lawns and roads—only 6 lbs. ground pressure per sq. inch—it trenches in close quarters between buildings, close to foundations—only 7'10" wide overall, readily clears overhead obstructions—only 6'8" high.

The 410 digs forward or reverse—undercuts walks, roadways and existing pipe and roughs out manholes. It gets around fast on the job—2.67 m.p.h. road speed. Handles like a car—full automatic controls and starter. Low operating cost 50 h.p. engine, constant center bucket line drive and other features galore that are bankable for contractors on defense and other projects. Let us rush you a copy of Bulletin 45—it gives the complete Model 410 story!

BUCKEYE TRACTION DITCHER CO.

Findlay, Ohio



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See other cost-cutting Buckeye Equipment on Page 31

Convertible Shovels



Trenchers



Tractor Equipment



R-B Finegraders



Road Wideners



Spreaders





A loaded 2-cubic yard bucket ready to be picked up by the new Dempster-Dumpster automatic loading device.

Speedier Pick-Ups Of Loaded Buckets

With all present standard equipment of the detachable-bucket type, it is necessary that some form of lifting chains which are permanently attached to the hoisting mechanism on the truck be attached to each loaded container in order to pick it up, and then they must be detached from the container when it is placed back on the ground after the load has been discharged and the empty container returned to the loading point. Dempster Brothers, Inc., Knoxville, Tenn., has announced a new Model AP Dempster-Dumpster in which this is eliminated entirely.

The new automatic pick-up is similar to a fork, the tines of which pass under the center of the bucket which stands just clear of the ground on two channel pedestals. The loaded bucket is then raised into carrying position for transportation to the dump or quarry. When dumping, the bail is engaged by an automatic dumping hook which discharges the contents of the bucket when the truck operator lowers the boom to accomplish that purpose. After discharging the contents of the bucket, the lifting forks raise it again into carrying position. The raising and lowering is done while the truck is in transit, thereby eliminating delay.

Complete information and prices of this new automatic pick-up unit may be secured direct from the manufacturer.

Bituminous Mixes Data Reported in New Booklet

A new 24-page booklet "1940 Performance Data and Laboratory Reports," just issued by the Barber-Greene Co., Aurora, Ill., is chiefly a report on four carefully separated central-plant bituminous jobs applying the continuous production principle of the Barber-Greene mixer to the higher-type bituminous mixes. Each plant was equipped with a Barber-Greene gradation control unit for separating and proportioning three sizes of aggregate separately.

A competent private laboratory was engaged to cover each job thoroughly, and Federal, state and city engineers were invited to witness each job in operation, take samples, and make analyses in their own laboratories.

The contents of this booklet include essential facts on the four jobs, followed by laboratory mix analyses made from

job extraction tests; the fundamental principles of the continuous mixer, including a flow diagram of the complete plant and a discussion of the detailed operations; how simple inspection control assures consistent results; and sug-

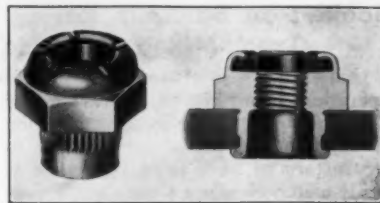
gested specifications both by results and by method.

Copies of this booklet, which should be of interest to state and county highway engineers and bituminous paving contractors, may be secured without obligation direct from Barber-Greene.

Fast Sheet Assembly With a New Stop Nut

A new clinch-type self-locking nut, with a knurled shank for fastening sheet metal assemblies in which some parts must be removed readily and returned to position, has been developed by the Elastic Stop Nut Corp., 2333 Vauxhall Road, Union, N. J. To install the nut, a hole is drilled in the structure and the shank is pressed into the hole. The mouth of the shank is then spread against the back of the structure to give a clinching hold. The knurling engages the drilled surface and thus assists in eliminating any turning of the nut.

The head of the nut is fitted with a



An assembled stop nut and a section.

vulcanized fiber collar which, being unthreaded, resists the entrance of the screw, thus automatically taking up all thread play and bringing the load-carrying thread faces of the nut and screw into a tight pressure contact. As the screw thread impresses its way through the collar, this pressure is maintained and increased to such a degree that the screw can not work loose, even under severe vibration. Because of the resilient character of the fiber collar, the screw may be removed and replaced repeatedly without loss of the locking action. These nuts are available in a wide range of sizes, thread systems, shank lengths and materials.



THAT'S HOW a hippo's mouth operates... and that's how the valves in your air compressors should operate.

In the service of contractors where dependable operation is essential, thousands of compressors are delivering full pressure at minimum cost... and valves keep CLEAN months on end with *Texaco Alcaid, Algol or Ursa Oils*.

These highly stable lubricants resist gumming, sludging and the formation of carbon deposits, assuring more efficient valve action and longer service between inspections.

The outstanding performance that has made Texaco preferred in the contracting field has also made it preferred in fields listed in panel.

Buyers in these fields are enjoying many benefits. You, too, will find important advantages when you use Texaco Lubricants and Fuels.

A Texaco Lubrication Engineer will gladly cooperate in securing more dependable operation of your equipment. Phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write: The Texas Company, 135 East 42nd Street, New York, N. Y.

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TEXACO Lubricants
FOR ALL COMPRESSORS AND AIR TOOLS

Channel Excavation Used in Highway Fill

**General Construction Co.
Moves 2,600,000 Yards for
Columbia River Highway
Under Cooperative Contract**

By HENRY W. YOUNG

(Photos on page 56)

THE construction of Bonneville Dam across the Columbia River between Oregon and Washington necessitated considerable highway relocation which has been going on above the dam since before the structure was started, resulting in great improvement of the Columbia River Highway. Below the dam, however, there is a stretch of approximately 21 miles of its present route, much of which is extremely tortuous and follows a contour which at one point carries it nearly 1,000 feet above water level. It is one of the most beautiful scenic routes in the country, and no doubt will be maintained as such for those who have the leisure to enjoy its charms.

But from the standpoint of modern transportation requirements, it is slow and hazardous, subject to slides in winter and to treacherous snow and ice conditions. Therefore a new water-level route is now in course of construction, known as the Troutdale-Dodson section. It will be approximately 18 miles long, as compared with 21 miles of the older route, and will have few curves, all easy ones, contrasted with several thousand degrees on the present route. From the scenic point of view, it will also have its advantages, providing the traveler with better views of the lofty wooded mountain sides, Multnomah Falls, Bridal Veil and all of the other famous cascades of the Columbia Gorge.

The Troutdale-Dodson Section

The Troutdale-Dodson section will eventually cost about \$4,000,000 and is divided into many sizes and kinds of contracts, some already completed, some still to be let and others under construction.

The principal features of the project are a bridge across the Sandy River near Troutdale, the contract for which has not yet been let; the Union Pacific overpass east of Troutdale, not let; an overhead at Dodson, not yet awarded; the Corbett-Rooster Rock grading and rock toe, completed by the Colonial Construction Co. of Spokane; rock toe embankment, Troutdale, Corbett and Bridal Veil Dodson Park, completed by Morrison-Knudsen; the Multnomah Falls-Oneonta section of rock toe, just completed by G. D. Lyon of Spokane; and a large hydraulic fill contract, awarded to the General Construction Co. of Portland, which got under way September 10, 1940, and will be completed next autumn. There will be later contracts for 3-foot riprapping, surfacing, etc., and it is expected that the

road will not be entirely completed for several years.

Hydraulic Fill

The dredging contract and operating methods of the General Construction Co. are interesting in a number of ways. In the first place, it is a cooperative type of contract between the Oregon State Highway Commission and the Federal Government. Considerable dredging has to be done in the Columbia River below the dam for navigation purposes. After studying the problem, river sections were established over a total distance of about 8 miles where the amount of channel excavation would approximately meet the fill requirements of the bordering highway projects. Actually about 4 miles out of the 8 were found to be feasible un-

der this plan.

These sections were then put together into one contract on which the General Construction Co. was the successful bidder. The total amount of material involved is 2,600,000 cubic yards. The contractor gets 10 cents a yard from the Government for channel excavation, channel measurement, or \$260,000. From the State, he gets 11 cents a yard, net embankment measure, or \$286,000. Culverts and incidentals bring the amount of the State's part of the contract up to \$314,550.

The channel from which the material is excavated varies in distance from 500 feet to approximately a mile from the highway grade. The general procedure is to build a 22-inch fixed pipe line at right angles to the shore. From the outer end of that, the dredge is worked downstream for a maximum of about 2,000 feet, digging one-half of the 600-foot channel width. Then the dredge is moved back to the starting point and the other half of the channel is excavated. When that is completed, the fixed shore



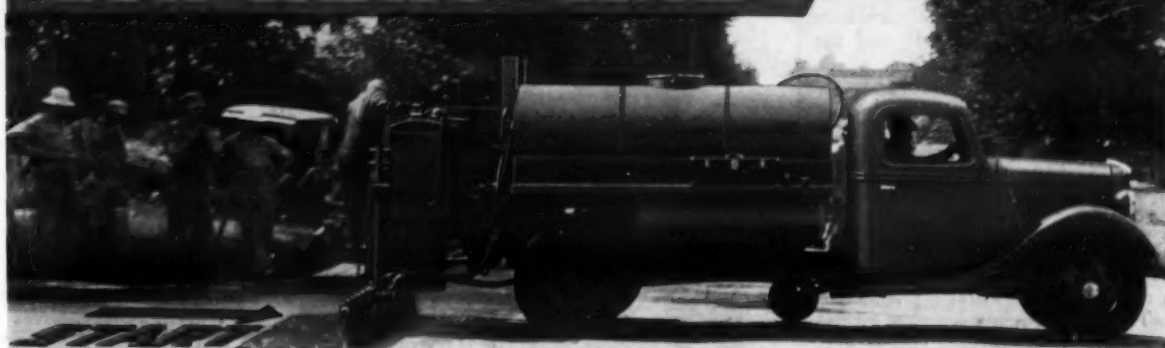
Left to right, J. C. Greeley, in charge of dredging operations; J. A. Bowers, Field Superintendent; and H. A. Dick, Vice President, General Construction Co.

line of the pipe is moved down, the cable connection on the power line moved, and the process repeated. The move is not always 2,000 feet, the amount of dredging at any one point being determined by the length of channel excavation required.

The rock toe, having a 10-foot crown and 1½:1 slopes, has already been

(Concluded on page 52)

INSTANT- STRAIGHT-LINE!



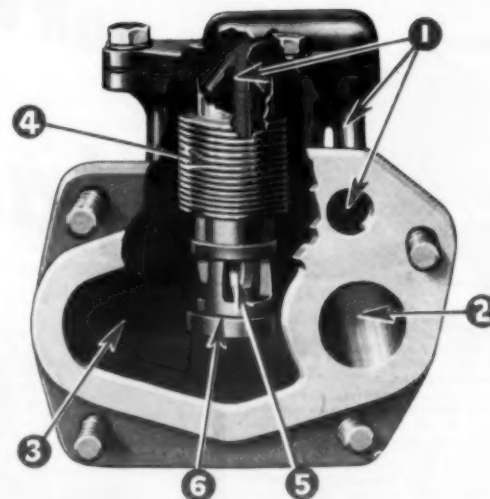
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Paper or Buckets Needed
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POSITIVE-AIR Spray Bar**

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For instant starting flip the lever back—as the air is released from the bellows, the ball lifts—and the hot material shoots through the spray tips. Opening and closing of valve requires only 3/16" travel of the ball. Bellows have a life expectancy of well over 50,000 applications. Spray bar can be cleaned by an air blast that returns material to tank, or by flushing with distillate. Remove three bolts, and the entire bellows and valve assembly is instantly accessible.



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The new Model AD Allis-Chalmers diesel-powered motor grader.

New Diesel Grader For Varied Service

A new diesel-powered grader designed for heavy grading, bank cutting, ditching both forward and reverse, oil mixing, and snow removal has been announced by Allis-Chalmers Mfg. Co., Tractor Div., Milwaukee, Wis. This Model AD grader weighs 21,500 pounds and is equipped with a General Motors 2-cycle diesel engine developing 75 brake horsepower. Increased earth-moving capacity is attained by allowing greater clearance under the front axle and circle, permitting the full volume of dirt to roll off the blade without hanging up in the axle or circle. The Hi-arch front axle has 22 inches clearance and there is 6¾ inches of clearance between the Roll-away blade and the circle.

The 10-inch tubular frame and heavy box-section girder construction are unusually strong. The lift cases are mounted directly over the circle for rigid blade control and the full revolving blade has a bank-cutting angle of 90 degrees and a reach of 5 feet 7½ inches outside the front wheels. The tandem-drive assembly is supported on a 4½-inch main drive shaft and is chain driven. The machine has a range of six forward and three reverse speeds and, with throttle control, forward speeds range from 1.48 to 16.6 mph and reverse speeds from 1.75 to 6.15 mph.

Full details may be secured direct from the manufacturer by mentioning this item.

Pulverizers and Crushers

Jeffrey swing hammer pulverizers are made in two types: Type A for general purposes and Type B for finer reduction, break-down and heavier work. Both types are made in a large number of sizes for either large or small capacities, with machines of medium weight for light work and extra heavily constructed machines for heavy work.

Catalog No. 710, recently issued by

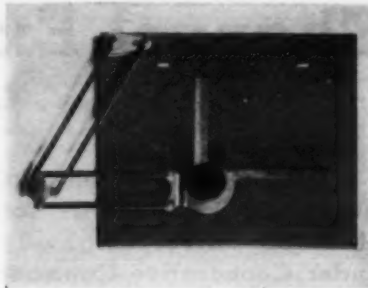
The Jeffrey Mfg. Co., Columbus, Ohio, illustrates and describes a number of its pulverizers and crushers dealing with reduction problems in all parts of the world and in a variety of industries. Working drawings are reproduced and there are tables giving approximate speeds, capacities and power, and typical results when crushing a particular material. Copies of this catalog may be

obtained by those interested direct from the manufacturer.

Drawing Tool for Engineers' Office

The new Drafto portable drawing machine is a handy time-saving tool for contractors and engineers who must make drawings or sketches quickly. Drafto can be carried with you wherever you go, and therefore is useful not only in drafting rooms but also in field offices and on the job.

The machines are made in four sizes, to take sheets from 9 x 12 up to 15 x 20 inches. The integral scales are made in one piece and are permanently attached to the protractor. The vertical scale is 4 inches long and the horizontal 5 inches long, full scale graduated in sixteenths. Longer detachable scales which can quickly be mounted on the shorter integral scales can be furnished. The protractor is graduated to 2 degrees and the graduations are deep and clear. Setting



The Drafto portable drawing tool.

is a simple operation. The clamping device produces equal locking tension at all angles and prevents slippage. Both scales can be moved 180 degrees. Because the two scales are made in one piece, they are never out of square with each other.

A new bulletin describing and illustrating the four sizes of Drafto portable drawing machines may be secured by interested contractors and engineers direct from the Drafto Co., Cochran, Penna., by mentioning this item.

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SWING
TRAVEL
(OR BOOM DERRICKING)**

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Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, ¾" cable used:
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Patent instant gear change and positive
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"Spare That Tree" G. H. Spears' Motto

**Winner of Central Section
Roadside Development
Award Used Great Care on
Indiana Grading Job**

♦ THE work for which G. H. Spears, Superintendent, Grace Construction & Supply Co. of Fort Wayne, Ind., received the Central Section Award in the CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards for 1940 was done on a 21-mile highway grading contract on Route 13 extending from 14 miles south to 6 miles north of Elwood, Ind. This contract for \$700,000 was started in May, 1939, and completed in September, 1940.

The contract included no items, other than sodding and seeding, which might be considered roadside-development items, and the specifications on these items did not justify any effort toward special work by the contractor.

However, in the course of the grading, considerable care was exercised by the contractor in preserving trees which would have been lost had he insisted on building the road to the section on the plans. An appreciable amount of expense was added to the contractor's work by carrying side ditches behind or between trees where the excavated material could not be taken out by mass production methods. But by so doing, many trees were saved.

In three locations of considerable length, the old road was left in place parallel to the new highway. The contractor dressed all of this area for no compensation other than common excavation, although it increased his work about four times the standard shoulder finishing. In addition, two borrow pits adjacent to the road were top-dressed with peat excavated at another point on the job, this dressing being done at no expense to the state.

Wherever possible, the sod in fill sections was pushed outside the slope limits and later pulled up to dress the shoulders and slopes. This was not specified or paid for.

Outstanding Job

In nominating Spears for one of the 1940 Roadside Development Awards, the Indiana State Highway Commission Engineers said, "The infiltration of landscape methods into general construction has become so common in Indiana that certain larger contractors are accepting responsibilities far outside any original contract. This project is representative of this type of work and is one of the outstanding grading accomplishments in Indiana to date."

Meet Mr. Spears

G. H. Spears, Superintendent on this job, started his construction career while still in high school by working summers for the LaGrange County, Ind., Surveyor. In 1924 he started work with the Indiana State Highway Commission, serving for 2 years as Plant and Road Inspector and for 3 years as Project En-

gineer on grading and concrete paving projects. In 1929 he became associated with the Grace Construction & Supply Co. of Fort Wayne, Ind., with which organization he has worked ever since.

This company, of which Martin J. Grace is President, has carried on street and highway construction in Indiana and Michigan since 1912. It is a member of the American Road Builders' Association, the Associated General Contractors of America, Indiana Highway Constructors, Inc., and the Michigan Road Builders Association.

Personnel

On this 21-mile grading contract for which Mr. Spears was Superintendent for the contractor, Robert M. Andrew was Project Engineer for the Indiana State Highway Commission for which Henry J. Schnitzius is Landscape Supervisor.

Roadside Development Awards to highway contractors will be made again next year, for work done in 1941.



Public Roads Administration Photo

A finished section on the Grace Construction & Supply Co. grading contract on Indiana Route 13. The extra work of constructing meandering ditches in order to spare roadside trees was one of G. H. Spears' contributions to roadside development, for which he received the Central Section Award for 1940.



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Wire Rope Service
Records our
customers keep
... the more
TRU-LAY
Preformed we sell."

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A Caterpillar diesel tractor and bulldozer, in service leveling off the area around the new U. S. Department of Agriculture Regional Laboratory, tried operating on soy bean oil, and it worked!

Soy Bean Oil Used As Fuel for Tractor

The U. S. Northern Regional Laboratory, at Peoria, Ill., the first of four to be completed for the Bureau of Agricultural Chemistry and Engineering of the U. S. Department of Agriculture, is about ready to open its doors. The building has been finished and is rapidly being equipped to carry on the work of increasing the industrial utilization of farm products.

An interesting side-light occurred recently during the heavy grading of the grounds preparatory to landscaping. The principal piece of equipment used for the purpose by C. A. Powell, contractor for the leveling work around the laboratory, was a Caterpillar diesel tractor equipped with a bulldozer. As an informal experiment, "just for fun," although entirely in keeping with the aims of the laboratory staff, Dr. P. B. Jacobs, Senior Chemical Engineer, asked that the tractor's tank be drained of diesel fuel and filled with crude soy bean oil.

The tractor engine of full-diesel design is started by a small gasoline engine mounted on the side of the diesel. Starting of the diesel on soy bean oil was instantaneous and the tractor resumed its leveling duties with equal power. Combustion was complete as no smoke issued from the exhaust.

Dr. O. E. May, Director of the laboratory, stated that the possibility of the production of agricultural motor fuels will be intensively investigated by the laboratory. This was not the first time soy bean oil has been used as fuel, for a diesel engine operating on this oil ran a generator powering the "mechanical barn" at the Ford Exhibit at the Century of Progress in 1934.

At present, the cost of soy bean oil is three or four times that of diesel fuel, but it is possible that because of the many products from soy beans its cost will be reduced in time.

Tunnel Driving Book

Tunnel driving has undergone as many radical changes in recent years as other lines of construction. While fundamentals have not changed, the application of new procedures has been made possible by the development and improvement of mechanical tools. Scattered through the engineering press are descriptive articles of individual tunnels, thus keeping apace with the advancing tunnel methods which have made the modern tunnel project an operation of ever-increasing magnitude.

To bring the essentials of these latest methods into compact form for quick reference, Harold W. Richardson and Robert S. Mayo have written "Practical Tunnel Driving," a 436-page volume, published by McGraw-Hill Co., New York City, Price \$5.00. In this book the authors have included diagrams and illustrations taken from projects completed in very recent years or which are in full construction at the

present time. While the descriptive text is at times over concise there do appear observations which will guide the line of thought of the engineer reader.

As organization of shaft and tunnel crews has undergone a material change along with modern developments in mechanical methods it would seem that a chapter devoted to typical tunnel manpower and gang rotations and the set-up for shield tunnels would have added a further touch of practical value. The chapters on Safety, Ventilation and Dust Control are particularly up-to-date and all offer many points that enter into efficient tunneling.

This book fills a gap in the long list of books on the subject. The preface well points out that "This book is intended as an aid to the engineer or contractor who has a tunnel problem at hand, not as a history of what has been accomplished elsewhere. It is hoped the experienced tunnel man will find much to refresh his memory, to recall details of operations perhaps forgotten, and perhaps a new idea for a new adaptation of an old idea that might be of aid." The book bears out these words, and while everything pertaining to the art of tunnel driving would fill an enormous volume, the picture of modern processes is here well presented.

Reviewed by: Herbert M. Hale,
M., Am. Soc. C. E.

Timken Personnel Shifts

F. H. Lindus, formerly Los Angeles Branch Manager in charge of the Service-Sales Division of the Timken Roller Bearing Co., has been transferred to the

home office at Canton, Ohio, where he is engaged in general sales promotional work. L. J. Halderman, Branch Manager of the Service-Sales Division of the Chicago Office, has taken Lindus' place in the Los Angeles office, while Jack

Gelomb, formerly Detroit Manager of the Sales-Service Division, has filled the vacancy in the Chicago office. Joe Jesseph, resident salesman in the Portland, Ore., Branch, succeeds Gelomb in the Detroit office.

WELDED ROLLED STEEL CONSTRUCTION for GREATER STRENGTH and SPEED



Lower Head Room

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Welded Construction insures longer wear—less breakage. Cutting down unnecessary weight means faster work—more yardage. Williams sheave arrangement keeps leads straight, less friction and fraying—longer cable life. Sheaves protected against contact with bucket load, open end sheave block prevents clogging.

Prompt deliveries and service through nation-wide distributors.

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built by WELLMAN

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DESCRIBING
EACH TYPE OF
WILLIAMS
BUCKET
FREE ON
REQUEST

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For example, consider the eight 60" reinforced concrete pipes, a total of only 20 tons. The Harrison Construction Co. of Pittsburgh, Pa. wrote, "The oddity of this load is not so much the weight as the bulk. This trailer carried a bigger load than a railroad car can haul, due to the extreme diameter of the pipe."

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Model AP (Automatic Pick-Up) which eliminates the "Hook-On" man, and offers further reductions in operating costs with

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Call, wire or write for the last word in Buck-
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Write for details of our
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Sizes: 1 1/2 cu. yds. to 6 cu. yds.
Capacities: 4500-lbs. to
12,000-lbs. net payload



Clean-Cut Paving On Jersey Highway

**Capacity of Route Serving
Jersey Shore Resorts from
Philadelphia Section Is
Doubled**

(Photos on page 56)

✦ DURING the summer of 1940, S. J. Groves & Sons Co., of Ridgefield, N. J., paved 6.98 miles of New Jersey Route S41 from Fellowship to Milford, doubling the capacity of this main highway leading from the Tacony-Palmyra Bridge which serves the residential section of North Philadelphia and connects with highways to the New Jersey coast resorts centering about Atlantic City. The project involved the purchase of 46 feet of new right-of-way to widen the original 80-foot right-of-way to 126 feet and then the contract paving of the new 20-foot roadway, duplicating the existing highway, with a 26-foot strip between the two pavements. The new pavement has a 5-foot gravel shoulder on the inside and a 10-foot shoulder and gutter on the outside. The center 16 feet of the 26-foot strip to divide opposing traffic is seeded with grass.

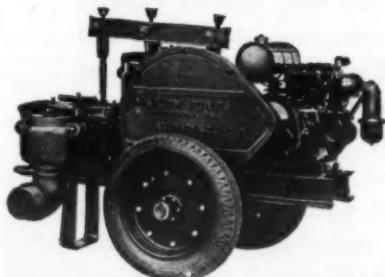
The job was notable for speed of operations, organization, and the special attention to subsurface drainage involving a total of 278 surface water inlets, over 21,000 feet of reinforced-concrete pipe for drainage and over a mile of extra cast-iron culvert pipe and tunneling under the old pavement for cross drainage. Work was started March 6, 1940, and completed well within the 140 working days specified in the contract which was awarded on the low bid of \$482,103.00. Roadway excavation required moving nearly 125,000 cubic yards of sandy loam with an equal amount of borrow in spite of the fact that this is a very level country with only a few feet of elevation separating the highest and lowest points.

Preparation of Grade

From end to end of the job an 8-inch sub-base of selected pervious material underlies the pavement. This was excavated by a Marion 362 diesel shovel loading to a fleet of four Sterling trucks powered with Cummins diesel engines which dumped the material on the grade. It was spread by a Caterpillar D7 tractor and LaPlant-Choate bulldozer and then spread to final grade by a Caterpillar No. 12 power grader and rolled with a 10-ton Buffalo-Springfield 3-wheel roller.

The contract required the removal of

4" Single Mud Hog Pump on Pneumatic Wheels



The "Old Reliable" Mud Hog brought up to date.

Gearing enclosed—running in oil.

All cut gearing.

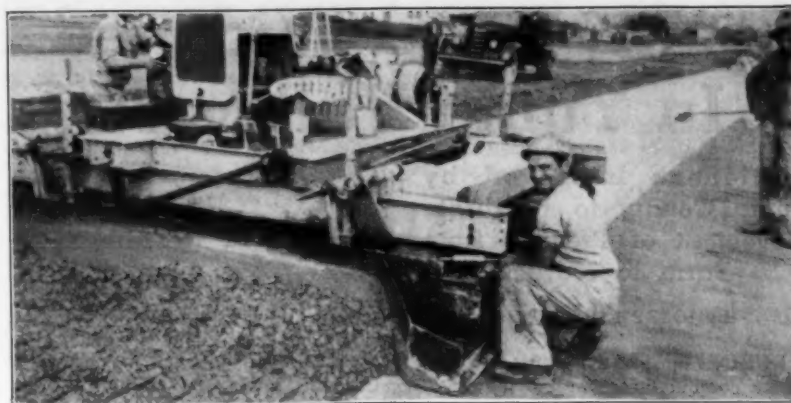
Die-forged crankshaft in pump.

Available in the ball valve Force type, or the flat valve Open Discharge.

Send for Bulletin No. CEM-40-D.

MARLOW PUMPS RIDGEWOOD, NEW JERSEY

5,945 square yards of reinforced-concrete pavement to permit the new design to function properly. This old concrete pavement, in very good condition, was broken with a skull-cracker and then the reinforcing rods cut with standard heavy wire cutters and the concrete pushed up into piles by a Caterpillar D7 and LaPlant-Choate bulldozer. It was then piled up on the outside of the pavement within convenient reach of the Marion crane and Universal truck crane for disposal. A very busy D7 tractor and bulldozer was noted apparently digging itself in, making a rather deep pit just sufficiently large for the tractor to turn around in and some 10 to 12 feet deep. On climbing out the tractor proceeded to push the broken concrete into the hole and then



C. & E. M. Photo

The Blaw-Knox 10-foot gas-mechanical finisher gets its regular greasing.

cover it up with the earth which it had dug out.

Drainage

In keeping with the best and newest practice, both surface and subsurface drainage received particular attention

on this job. The 278 inlets are distributed throughout the length of the job and are provided with an opening in the cast-iron section which is set in the curb and also a removable grating in the gutter. To make these inlets func-

(Continued on page 24)

For
Pennsylvania's Turnpike
**TELSMITH
EQUIPMENT**
*Served in These Twelve
Commercial Quarry Plants*



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Shippensburg, Pa.



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**OTHER PLANTS (not shown) USING
TELSMITH EQUIPMENT:** Hunkin-
Conkey Construction Co., Somerset, Pa.;
J. F. Sours, Carlisle, Pa.; Vang Crushed
Stone Co., Connellsville, Pa.; Pennsylv-
ania Supply Co., Harrisburg, Pa.; Lym-
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Write for Quarry Plant Bulletin QP-34

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County Road Widened In Yuma Valley, Ariz.

**Bottleneck Improved by
Yuma County to Facilitate
Movement of Produce from
Farm to Market**

By JOSEPH C. COYLE

† DURING most of the year, truck and trailer combinations are moving farm produce of some kind from the fields of Yuma Valley in Arizona to local packing sheds or railroad sidings in Yuma or directly to markets on the Pacific Coast. The paved roads over which they start their journey, constructed years ago when traffic conditions were much different, have been too narrow for safety in recent years. Accordingly, Yuma County has been widening and improving the main arteries during the past two years.

One of these projects, recently completed, covers a mile and a half of Eleventh Street in Yuma, extending from Avenue B in the valley up over the rim of Yuma Mesa to the intersection with U. S. 80 at what is known locally as the Big Bend. At that point, 4 miles south of Yuma, Route 80 swings eastward in a curve 1,050 feet long and banked 5 degrees 30 minutes. At the west end of this curve a narrow road continues straight south, crossing the 15-foot pavement of Eleventh Street which intersects the main highway at the east end of the bend. To avoid the sharp right-angle turn on the narrow pavement of this crossroads, traffic between Yuma and the valley had used a short dirt cut-off across the corner of a vacant lot. There is not much traffic on the road leading south, but it is expected that it will increase in the future as new mesa land is brought under irrigation.

Taking a tip from the "corner cutting" practiced by the traveling public, Yuma County engineers laid out a sweeping curve 950 feet long and banked approximately 6 degrees, swinging westward from Route 80 onto Eleventh Street. This curve and the one in Route 80 form a large Y, with Eleventh Street's original road bed joining the wide ends and the south-bound road the leg of the Y. The project also included the widening of

the old asphaltic pavement of Eleventh Street 3 feet on each side, from the Y to Avenue B in Yuma Valley, by adding new material.

Widening Operations

The work of widening was started first. One at a time the shoulders were excavated to a depth of 6 inches, using a Caterpillar No. 10 patrol and finishing up with hand labor.

On a filled grade between a shallow cut in the mesa rim and a bridge over the east main irrigation canal, it was necessary to extend the shoulders for the new subgrade. This was done by excavating the banks of the cut with a 3/8-yard Hanson shovel. The dirt was loaded into dump trucks and distributed on each shoulder of the fill. At the same time



A Caterpillar motor patrol and sprinkling truck laying fine cover on the rock base on the curve approach to Eleventh Street in Yuma, Arizona.

this widened the shoulders of the road through the cut and opened up ample drainage ditches on the sides. Side drainage channels were also dug west of the bridge and the excavated material used to extend the road shoulders.

To protect this fill from erosion by the infrequent rain storms, WPA crews constructed small shallow drains in the slopes at several low points on each side

of the roadway. These were lined with loose rubble and a thick grout poured over the whole which was finished off with hand trowels. A 36-inch Armo corrugated metal culvert installed in 1922 at a point where a small wash crosses the road was lengthened by adding a couple of 3-foot sections of concrete pipe under each new shoulder and then building rubble head walls

(Concluded on page 32)

TRAXCAVATOR*

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GRADES • STRIPS

BULLDOZES • LEVELS

CLEARs LAND • PULLS

BACKFILLS • CASTS

DIGS • REMOVES SNOW

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"TRAXCAVATORS"—the heavy-duty tractor excavators not only dig but load, grade, carry, bulldoze, and spread; in fact, there is no limit to their usefulness on any project. Mounted on "Caterpillar" track-type tractors they have the speed, power and traction to operate in toughest conditions. "TRAXCAVATORS" are furnished in three models with a wide variety of bucket sizes, extra equipment and attachments to make them the MASTER OF ALL JOBS. Sold and serviced by "Caterpillar" dealers everywhere. Further information and completely illustrated catalog upon request. TRACKSON COMPANY, Milwaukee, Wis., U. S. A.

*REG. U. S. PAT. OFF.

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EQUIPMENT MAINTENANCE COSTS...**



**The
SELF-LOCKING NUTS**
that can't be loosened by
vibration or hard service

...specify them on new equipment
and use them for replacement.

• Folder explaining the Elastic
Stop principle is worth writing for.

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2333 VAUXHALL ROAD • UNION, NEW JERSEY

**Elastic Stop SELF-LOCKING
NUTS**

Defense Deliveries Over Lighted Roads

Industrial and transportation facilities are being called upon to speed up with safety for the greatest manufacturing program the United States has ever seen, Dudley M. Diggs, General Electric Engineer, told the Ohio State Safety Conference recently. This program will demand greater efficiency on the part of distributing, producing and safety agencies as well as an enlargement of these facilities, he said.

Increased use of main streets and highways at night to help deliver these

goods was forecast by Mr. Diggs. "Only one-third of the traffic now flows at night, but it is reasonable to believe that with adequate lighting systems this night traffic can be increased and speeded up with safety, particularly on the trunk routes. This can be done without overloading many highways which would be the case if the increased traffic traveled in the daylight."

To increase night traffic without providing proper safeguards, however, will only send the night death rate skyrocketing, the Conference was told. Night traffic deaths for the nation are now about 60 per cent of total traffic deaths,

and are caused by one-third of the total traffic.

Sealed-beam headlights, a new development which increases night visibility, now help the motorists drive with greater safety on thousands of miles of secondary and rural highways which do not justify permanent lighting. For main trunk routes, where traffic is known to be heavy and night accident rates are out of proportion, Mr. Diggs pointed out that scientists have developed lighting systems which will alleviate dangerous congestion and reduce abnormal night accident rates.

Recently in Detroit, Mich., and Hart-

ford, Conn., such systems have proved their value by drastically reducing night accidents, Mr. Diggs said. "Hartford has reduced the cost of night accidents by \$78,000 on fourteen relighted streets in two years. This is \$61,000 over and above the cost of the new lighting which cut night accidents from twelve to one in periods two years before and after the new lighting." In Detroit, seven persons were killed at night for every one killed in the daytime on 31 miles of main streets in 1936. Now modern lighting has cut that abnormal rate and you can travel those main streets as safely as in the daytime, Mr. Diggs said.

A "4-LANE HIGHWAY" to Profit!

ALL power costs you money. But the right kind of power can make you money. And that's the kind "Caterpillar" Diesel offers ... in these four types, to be applied to practically every phase of every one of your jobs!

The Western Contracting Corp., Sioux City, Iowa, used them here — on moving the Santa Fe Railway tracks to make room for the John Martin Reservoir, near Caddo, Colorado. If you want to know how this company feels about "Caterpillar" Diesel Power, here's what H. C. Boswell says: "Many years of three-shift operations lead us to favor 'Caterpillar' products."

It's three-shift operations, day in and day out, that show the remarkable stamina and dependability of "Caterpillar" Diesel. And it's any operation that will show its fuel economy ... a better-than-average Diesel economy through the ability of this equipment to run efficiently on the low-priced, non-premium grades of fuel!

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR DIESEL

ENGINES AND ELECTRIC SETS

TRACK-TYPE TRACTORS • ROAD MACHINERY

(Upper) STATIONARY POWER! A "Caterpillar" Diesel D13000 Engine powers this Keesling dragline with a 90-foot boom. Shown setting forms for railroad bridges. • (Lower) MORE STATIONARY POWER! A "Caterpillar" Diesel D4800 Engine powers a Dayton Dowd 3-stage centrifugal pump. 4-inch main ... 19,000 gallons an hour ... pumped as far as 5 miles!

ELECTRIC POWER! One of two 48-30 "Caterpillar" Diesel-Electric Sets used by the Western Contracting Corporation to drive pumps and furnish lights and power for the office, shop, etc., at the John Martin Reservoir. These sets are self-regulating; automatically adjust themselves to supply steady voltage. Can be set up anywhere. Need no external control apparatus! (Available in sizes from 15 to 90 kilowatts.)

ROAD-BUILDING POWER! Good haul roads save you money. And good haul roads are inexpensively made and inexpensively maintained when you turn the job over to a fast-working "Caterpillar" Diesel Motor Grader—the machine that's often called "a highway department in itself!"

EARTH-MOVING POWER! Hundreds of contractors will tell you that cost-cutting big-yardage hoops moving at a sure, profit-making pace with an outfit like this: a "Caterpillar" Diesel Tractor teamed up with a LeTourneau Carryall Scraper. Tractors in sizes from 25 to 97 drawbar horsepower.



The International Trojan Utility patrol

A New Power Grader For Town and County

A power grader with hydraulic control and weighing only 8,800 pounds has been announced by Contractors Machinery Corp., Clinton Street, Batavia, N. Y., as particularly adaptable for the maintenance of town roads and county highways for year-round service. This International Trojan Utility Patrol is powered with an International H or M tractor with the 10-foot blade mounted between the front and rear pneumatic-tired wheels. The blade is 14 inches high, $\frac{1}{2}$ inch thick and has a $\frac{1}{2}$ x 6-inch cutting edge. It can be raised to clear the ground by 9 inches and dropped 5 inches below the surface of the ground and can be swung 90 degrees.

The operator sits at the back of the machine and controls all blade movements, including the swing, by hydraulic power through finger-tip levers at his right. The unit has five speeds forward ranging from $2\frac{1}{2}$ to 16 miles per hour, is 15 feet long overall and 76 inches high to the top of the steering wheel, with a rear wheel tread width of 64 inches. The Trojan Utility Patrol has a weight of 2,420 pounds on the front wheels and 6,380 pounds on the rear wheels, making a total of 8,800 pounds.

New Cleaning Solvent For Tanks and Machines

The production of fuel oil is as efficient and exacting as human ingenuity and modern science can make it, but there are natural elements caused by changes in temperatures in fuel oil storage tanks which change the characteristics of any oil. The resultant accumulation of moisture is a forerunner of sludge and other tarry substances which cause partial stoppage of oil filters, thus adversely affecting the efficiency of the unit.

The new Siloo fuel oil tank solvent, made by Petroleum Solvents Corp., 331 Madison Ave., New York City, is a positive-acting treatment for cleaning such tanks and equipment, developed solely as an antidote to clogged oil filters and pipe lines and to assure trouble-free operation. The solvent contains no harmful acids, explosive ingredients, or any other materials which could harm in any way the normal processes of equipment and combustion.

Further information on Siloo solvent and its application to the construction field for cleaning fuel oil storage tanks and the fuel systems of engines and equipment may be secured by interested contractors, state, county and township engineers direct from the manufacturer by mentioning this item.

New Truck-Mixer Bulletin

A new 8-page bulletin, No. 175, describing and illustrating Ransome truck mixers and agitators, has just been issued by the Ransome Concrete Machinery Co., Dunellen, N. J. The various features of these units are discussed, and action photos of the mixers at work are included.

Copies of this new bulletin may be secured direct from the company.

Bench-Type Cap Crimper Provides Waterproof Seal

A new bench-type cap crimper which differs widely in its action from the ordinary sleeve or segment type has recently been developed by engineers of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Its difference in action from the ordinary sleeve or segment type is due to the fact that two smooth continuous internal beads on the throat of the cap grasp the covering of the fuse so closely that a waterproof seal is made without employing the usual waterproofing compound. Thus, the waterproof resistance of the capped fuses becomes dependent on the water-resisting properties of the fuse, rather than on keeping water out by means of the crimp.

In operation, the crimper is mounted on a bench and the caps crimped onto the fuse by inserting the freshly cut end of the fuse as far as possible into the cap and pushing the fused cap all the way into the throat of the crimp-

er. One full stroke of the machine performs the necessary operation.

Full details may be secured direct from the manufacturer by mentioning this item.

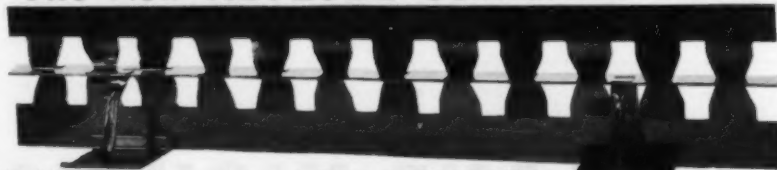
New Dealers Appointed

The Karcher-Wolter-Foley Co., Wichita, Kansas, the Southern Equipment & Tractor Co., Monroe, La., and J. S. Main,

Seekonk, Mass., have recently been appointed distributors for the line of construction machinery made by the Osgood Co., the Hercules Co., and the General Excavator Co., all of Marion, Ohio.

The Scranton Tractor & Equipment Co., Scranton, Penna., and the Tractor & Equipment Co., Sidney, Montana, will distribute the Ironroller, made by the Hercules Co., in their respective territories.

The New KEYLODE Contraction Joint—



Highlights of this new joint:

1. A rigid, fully assembled unit for transverse contraction joints, ready to be spiked to subgrade. (No dowel bars required.)
2. The heavy plate shoes with arm traces insure uniform installation alignment of dowel plate.
3. The concrete slab edges are interlocked above and below the 14-gauge key-plate to transfer heavy traffic loads.

4. Economy in initial cost and lower installation cost, mean a substantial saving over present dummy-joint methods.
5. The KEYLODE contraction joint, with 12-gauge plate dowel, also acts as a seal, and with the 30-gauge dividing plate held $\frac{1}{2}$ " below top of slab, eliminates the necessity of edging and filling top of joint.
6. KEYLODE contraction joints are furnished crowned or straight, as may be specified, and are shipped painted and greased. (To break bond.)

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PRODUCTS
COMPANY**
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Birmingham, Alabama



An **All-Wheel-Drive** TRUCK
—you can **AFFORD** to Buy,
and **CAN'T AFFORD** to be without!

If you have a job where two driving wheels are not enough—and you can't afford or use a big *All-Wheel-Drive* truck—get a demonstration of a Marmon-Herrington *All-Wheel-Drive* converted Ford!

You'll be amazed how much bigger loads you can haul through loose sand, gravel, mud, dirt or snow. You'll be surprised with the number of extra trips you will make in a day. You'll be astonished at the ability of these vehicles to climb out of pits and dumps, to travel with greater safety on slippery highways, to operate under-body graders or to push snow plows through heavy drifts.

And best of all—you'll be surprised at the startlingly low price and operating cost, as compared

to any other *All-Wheel-Drive* vehicles on the market.

For Marmon-Herrington *All-Wheel-Drive* converted Fords have all the inherent virtues and advantages of standard Fords—plus power and traction applied through all four or all six wheels. The result is more effective power, greater ability and greater economy of operation than you would ever believe. They incorporate the same outstanding features of design and construction which are found in Marmon-Herrington Heavy-Duty *All-Wheel-Drive* Trucks, built in the same plant by the same workmen.

Write for literature showing these vehicles in action, and the name of the nearest Marmon-Herrington dealer. Cable address MARTON.

MARMON-HERRINGTON CO., INC. • INDIANAPOLIS, INDIANA, U. S. A.

Long Concrete Flood Wall Poured with Unit Forms

**Section of Ironton, Ohio,
Wall Built by W. H. Mueller
With Unit Steel Forms and
Ready-Mixed Concrete**

† THE 3,100 feet of inverted T-section cantilever-type concrete flood wall built under contract by W. H. Mueller Co. of Detroit, Mich., on the Ironton, Ohio, Flood Protection Project involved a combination of no forms for the footing and cut-off wall and a special unit panel steel form for the walls. The average footing on this contract was 10 feet long from the center line of the wall to the outer edge of the cut-off wall on the water side, 7 feet on the land side, and 1 foot 4 inches thick. The cut-off wall is 2 feet 10 inches wide at the top, 2 inches wide at the bottom, and 5 feet deep. An 8-inch corrugated metal pipe drain embedded in sand and gravel is located at the land-side toe of the footing.

Footing Excavation

The stiff clay which serves as a foundation for the footings of the concrete cantilever walls was so firm that no forms for the footings were required. The area for the footing was excavated by a Bucyrus-Erie $\frac{3}{4}$ -yard gas-air power shovel and the cut-off wall trench was excavated by a Barber-Greene trench excavator. These were followed by a crew of seven men and a foreman, hand-trimming the sections with more than usual care because of the absence of forms in pouring the 30-foot sections. These sections were uniform for the footing as well as for the walls and were poured alternately. A crew of three men assembled the heavy reinforcing for the cut-off wall and also for the footing. These assemblies were placed on concrete blocks in the trench to give them the proper spacing from the bottom of the various units. No forms were used but at the ends of each 30-foot section bulkheads were set up, carefully staked in position for the footing slab and supported with Roos shores in the cut-off trench.

The Wall Forms

The contractor used the unit steel forms produced by Economy Forms of Des Moines, Iowa. These consist of uniform 30-inch square panels with welded flanges on all four sides and numerous holes in the flanges for tying adjacent forms together with a special clamp consisting of a pin which is inserted in the hole and a handle and wedge-shaped clamp which is pressed down over the two flanges. The form ties consisted of

1-inch wide x $\frac{1}{8}$ -inch thick steel straps which were wrapped in paper and were stiff enough to act both as form ties and spreaders. These were inserted in the forms and then locked in position with a heavy nail driven through a hole in the strap as well as a hole in one of the intermediate punched channels welded to the face plate as stiffeners. Before stripping the forms, the tie straps were released by pulling out these nails and then with a special pulling device were pulled entirely out of the wall as the paper cover prevented their bonding with the concrete. In order to make up walls of varying heights, the panels are also made in varying widths but uni-



C. & E. M. Photos

Assembling reinforcing for the cut-off wall to be poured in the trench without inner forms. At left, braces in the cut-off wall trench for the bulkhead at the end of the section. This is part of a flood-control project at Ironton, Ohio.

formly 30 inches long. This takes care of 6-inch increments, but the contractor had numerous places where the difference was 2 inches and this was taken care of by building up the base of the forms

with lumber of the proper thickness and setting the forms on top of these sills. The walls are uniformly 18 inches wide at the top and battered $\frac{3}{8}$ inch per foot
(Concluded on page 40)

Accuracy At Every Step

There are no "Short Cuts" to Building Uniform Quality into Briggs & Stratton Gasoline Motors

The most modern tools and equipment, manned by highly skilled workers, and constant inspections are used to maintain the uniform quality necessary to meet Briggs & Stratton standards. That is why these motors lead all others in the small gasoline motor field.



Crankshafts Made In Volume Production With Watch-like Precision

Illustrated above is one Briggs & Stratton crankshaft production line. Nineteen successive machine operations on specially designed equipment are used to make crankshafts. At every operation, each crankshaft is checked, tested and gauged for balance, diameter, fit and workmanship before it wins its "OK" for release to the assembly line. Here is another example of volume production combined with watch-like precision that insures uniform quality — and why Briggs & Stratton offers more motor value per dollar.

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Hayward Buckets

IT'S POWERED RIGHT WHEN IT'S POWERED BY BRIGGS & STRATTON

Strategic Network Must Meet Transport Needs

(Continued from page 1)

and supplies traveling at top speed from any one point in this country to any other point; they must be able to stand up under increased transportation of raw materials and supplies to industrial centers and of manufactured goods to their ultimate destination; and they must continue to take care of civilian needs—all this without complete traffic tie-ups in an emergency.

In an address before the Thirteenth National Asphalt Conference last December, Captain William C. Baker, Jr., Corps of Engineers, pointed out that military transport does not differ greatly from the civilian motor transport using the highways today. The crux of the defense highway situation is that we have an enormous mileage which is inadequate for today's peace-time civilian needs.

One of our vital weaknesses is in our bridges. The new standard H-15 bridges are adequate to carry present military loads, but there are many bridges which do not meet this rating. In addition, in order to carry present military loads, there are restrictions on the manner and speed at which the heavier tanks pass over these bridges. Such restrictions are undesirable. It is entirely possible that tanks and other military equipment of the near future will require stronger bridges, for events move so swiftly these days that obsolescence in military equipment is upon us almost before equipment is off the assembly line. Speaking before the annual convention of the American Association of State Highway Officials, Arthur W. Brandt, Superintendent of Public Works for New York State, pointed out that that state is now building H-20 bridges on all routes, that the average H-20 bridge costs only 10 per cent more than an H-15 bridge; and that the H-20 bridge will more than pay for its extra cost through longer life, even on roads which will never carry loads in excess of 15 tons.

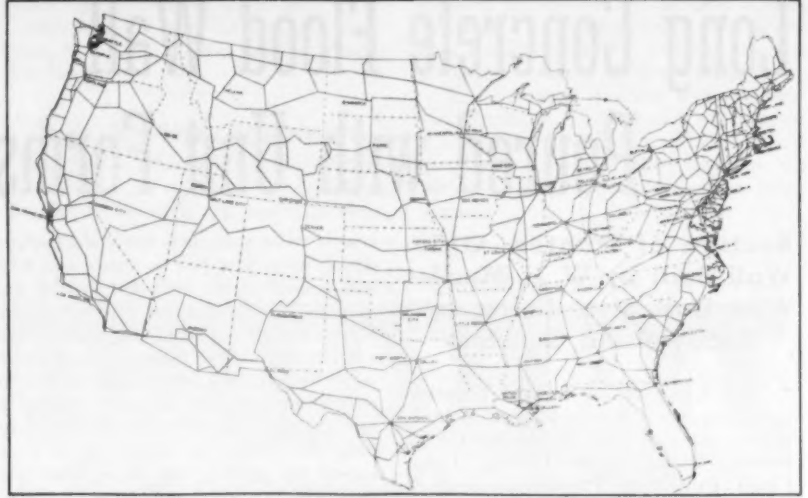
Another deficiency in our road system, Captain Baker pointed out, is insufficient width. The requirement that the width of bridges be 4 feet in excess of approach roads will help to eliminate bottlenecks, and all road surfaces should be widened immediately to 20 feet, which is the minimum specified, although a width of 22 or 24 feet is desirable for the more important routes.

Adequate shoulders are another necessity for military transport. In this respect many of our otherwise adequate highways are sadly deficient. Shoulders should be wide enough to enable military convoys to pull off the road during halts so as not to block the road for other traffic. For this purpose shoulders 8 to 10 feet are needed. Since widening shoulders to that extent is difficult or practically impossible in some locations, an alternate solution is to provide long parking spaces for convoys at intervals on both sides of the road. This is included in the revised standards set up by the Public Roads Administration.

Thus far we have been discussing our main highways. Other roads are impor-

tant—very important—for military operations, Captain Baker pointed out. Access roads to military establishments and industrial areas are necessary, and roads for tactical purposes should be mentioned. If we ever fight in this country, many roads which are now relatively unimportant may have to carry an enormous military load. Obviously all of this highway mileage can not be improved within the next few years, but it might be well, on these highways, to "look first to your bridges." Their strength will determine whether or not the military can go through.

In addition there are special requirements for military transport in urban and industrial areas. This important phase of the problem is now being studied by the War Department and the Public Roads Administration. With



The strategic network of highways vital to our defense.

military traffic imposed on an increased commercial traffic caused by expansion for war, special consideration must be given to the routes through and around

cities, particularly the large industrial and shipping centers.

Suitable road intersections constitute

(Continued on next page)

GET OUT IN FRONT with EUCLIDS



WHETHER your contract is large or small, whether it calls for improving a highway, building an airport, or increasing the capacity of an industrial plant, you can do the job better, faster, and more economically with Euclids!

C. J. LANGENFELDER & SON, for example, selected three 13-Yard Bottom-Dump EUCLIDS to haul 60,000 cu. yds. of sandy material for approaches to a bridge near Elkton, Maryland. On a comparatively short but tough haul, the great tractive power, mobility, and quick dumping of these big Euclids enabled them to do the job with the utmost speed and economy.

Contrast this with RALPH E. MILLS' contract for enlarging Norfolk & Western's railroad yard at Roanoke, Virginia. On this job twelve of the same size Bottom-Dump EUCLIDS are hauling a million cu. yds. of excavation... 40,000 cu. yds. in one week over a mile haul. Yet it's the same Euclid qualities—great capacity... speed on the haul road... flotation and power on the fill... quick dumping... economy of operation... and the stamina to keep going at a terrific pace, which puts Euclids out in front on jobs like this!

Increase Your Contract Opportunities With Euclids!

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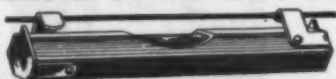
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EARTH • ROCK • COAL • ORE
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SAND'S-STEVEN'S Line & Surface LEVEL



Endorsed and Adopted by Road
Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8831 Gratiot Ave. Detroit, Mich.

Improvement Needed On Essential Roads

(Continued from preceding page)

another problem in time of war. At many of them at present, traffic when it is heavy is held up, sometimes for miles. Long lines of either civilian traffic or military traffic would make an excellent target for a dive bomber or an aerial machine gunner. Captain Baker suggests that they couldn't miss.

We have also given little thought in this country to camouflage, Captain Baker states, and by this he does not mean hiding the roads. Anything which confuses an enemy bomber or observer or which reduces the visibility of an important objective is effective camouflage. Therefore all the main roads in an area should not lead directly to a large factory, air field, or other military objective.

Even in peace time, bottlenecks in the road system are weak links and cause inconvenient and costly delays. In time of war, these bottlenecks, such as just one road through the mountains, just one bridge over a stream, are particularly dangerous. The elimination of such bottlenecks should be achieved as quickly and to as great an extent as possible, but this is a difficult and expensive task. Such bottlenecks as can not be eliminated should be protected.

In summing up Captain Baker said, "Generally, roads for commercial purposes will serve military needs. Civilian standards of construction will suffice for military transport. However I have mentioned a few special requirements which may be overlooked in time of peace but which are important in war. Our highways have been greatly improved in recent years but much remains to be done before they are adequate for war."

Present Status

The table on page 50 indicates the mileage on the strategic network of highways in the various states, the mileage of strategic network highways which is below standard, the number of bridges on the network which are below standard and the estimated cost for bringing strategic network highways and bridges up to War Department standards. It is interesting to note that although the estimate for highways and bridges on the strategic network amounts to approximately \$1,200,000,000 and \$100,000,000 respectively, the various state highway departments estimate that the cost of bringing their entire state highway mileage up to standard would run from two to twenty times that amount, with the majority about two or three times the sum required for the strategic network. The American Association of State Highway Officials reports that the urgent needs on state highways total \$3,664,296,000, while the amount of money available for this year by state highway departments is estimated to be about \$600,000,000.

Financing

How is this necessary highway work to be financed? As yet no definite program has been arranged, but it seems obvious from the figures on the necessary amount of work to be done and the money now available that some special provision must be made to speed things up.

There is a general feeling among state highway officials that this work must be financed by special Federal appropriation. Chris J. Sherlock, Alabama State Highway Director, says, "We believe that roads constructed solely and exclusively for military purposes are essentially a national military preparedness item of expenditure and the cost should be borne by the Federal Government on the same basis as the con-

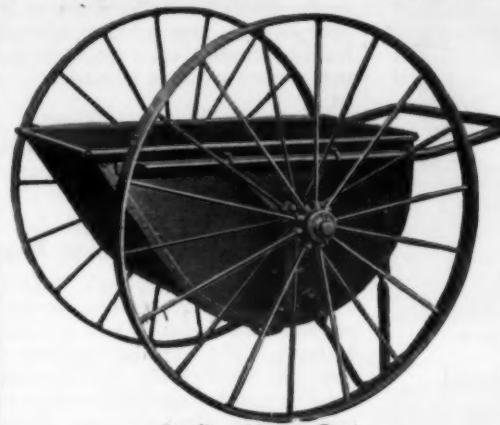
struction of cantonments, etc., and that it is unfair to ask the state to participate in the construction of these non-highway projects.

"For projects that will necessarily have to be over-built solely for military use, it is our opinion that the state should participate in the construction of these only to the extent that finances will permit the necessary work to care for present and future local traffic within a reasonable number of years. However, revenues at this date will not permit the participation in many such projects in this state due to the fact that we already have heavy programs and agreements reached for the construction of rural state highways to state standards that will reasonably serve the present and future needs from the local state standpoint.

"It is believed that through national legislation adequate basis of financing both roads of military importance and strategic importance can be made. These measures of defense are a national prob-

(Continued on page 50)

STERLING No. 6 CONCRETE CART



Sterling No. 6 Cart

6 cu. ft. capacity
42" dia. wheels
12 gauge tray
Malleable Trunnions
With Plain or Roller
Bearings

A COMPLETE LINE
OF STERLING
WHEELBARROWS
AND CONCRETE
CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

MAKE MORE MONEY ON YOUR ROCK CONTRACT!

● The way to do it is to put Cleveland Rock Drills on the job. Clevelands cut rock in a hurry. The patented valves used insure hammer speed and powerful blows, strong rotation and good hole blowing. An especially advantageous feature is the air economy of Cleveland Drills. Generally operated from portable compressors, drills that save on air also save your compressor. Put a Cleveland on your hose line, and watch the pressure go up, and the footage per day increase by leaps and bounds! More holes in a day at less cost per foot of hole. Don't take our word for it—put Clevelands on the job. Find out for yourself what these good machines will do in making for you more money on your rock contracts.

● Cleveland Hand Held Drills are made in a large variety of sizes, weights, and types. Tell us the kind of rock, the depth of holes, and other particulars of your rock job, and we will gladly send the Cleveland drill that will turn the trick!



Operating a Cleveland H111 with 1 1/4" round lug steel on a big road contract in North Carolina.

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THE CLEVELAND ROCK DRILL COMPANY

3734 EAST 78TH STREET • CLEVELAND, OHIO

Cable Address: ROCKDRILL

LEADERS IN DRILLING EQUIPMENT



The new Bucyrus-Erie 15-B.

A New Small Shovel, New from End to End

Too frequently manufacturers of construction equipment make a machine just a little heavier so that it may be called a larger model, or shave down a model to make it the next smaller size. Bucyrus-Erie Co., South Milwaukee, Wis., has announced the development of a wholly new $\frac{1}{2}$ -yard excavator, the 15-B. Simplified front-end construction makes the new unit easily convertible in the field from shovel to dragline, crane or drag shovel. Standard power is a 54-hp gasoline engine with a specially-designed carburetor and manifold to give peak efficiency under rapid load fluctuations. Both diesel and electric power are also available.

The engineers of Bucyrus-Erie report that the proportion of power and speed in the hoist, crowd and swing is smoothly balanced for fast digging. Direct-action clutches give the operator the "feel" of the load and a sureness of touch which gives him accurate, smooth control over every phase of the fast digging cycle.

Particular attention has been paid to the boom hoist control on the 15-B. The boom hoist lever is conveniently located in the main lever bank in front of the operator, giving independent high-speed power-controlled raising or lowering. This lever can be set in the down position and the operator's hand removed for use in swinging, hoisting or propelling. The boom lowers at a standard set rate until the lever is returned to neutral. The booms for dragline, clamshell and crane service are all-welded to give maximum range

and capacity per pound of weight. Field convertibility has been simplified by mounting the crowd rope and drums on the shovel boom. No clutch or brake changes are required for conversion from a dragline or crane to a shovel, only the crown-chain unit need be added.

Full details of the new $\frac{1}{2}$ -yard 15-B may be obtained by writing direct to Bucyrus-Erie Co. and mentioning this item.

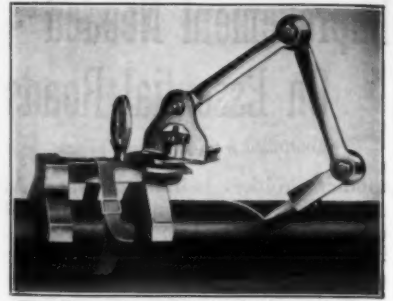
New Roebling Sales Mgr.

The John A. Roebling's Sons Co., Trenton, N. J., has announced the appointment of Ernest C. Low as General Manager of Sales for that company. Mr. Low, who has been with the organization for 32 years, has served in various sales capacities in the California Division, and in January, 1940, was elected President and General Manager of the John A. Roebling's Sons Co. of California. He assumed his new duties in Trenton on March 1.

Angle-Cut Layouts On Rods and Pipes

With the increase in the use of welding for pipe and rod connections, contractors are interested in accurately laying out the angles for the cuts in the pipe before starting cutting. This applies especially to lines for compressed air with many turns, either for use in the field or for installation at activated-sludge sewage treatment plants. The Junior Trumark protractor made by Tru-Line Corp., 6022 Wilshire Blvd., Los Angeles, Calif., is designed to speed up this work by eliminating calculations and the use of templates.

To mark around a pipe, the Trumark is placed parallel to the center line of the pipe, and held in place by a strap. The desired angle is set on the protractor and locked on the 180-degree scale. Then the flexible arm marks completely around the pipe. The protractor is capable of scribing all structural shapes and degrees on any sheet; determines the degree of any angle in



The Trumark protractor laying out the line to be cut on a pipe.

any position; and is equipped with a master level.

On any rectangular form, the Trumark is set up as on pipe, or held square to any edge or corner. For machining, the forward edge also shows the exact angle of any cut. The plumb bob indicator shows any degree of angle from a horizontal plane.

Complete information on the Junior Trumark protractor may be secured direct from the manufacturer.

WALTER SNOW FIGHTERS do the job from top to bottom

Have you ever tried to peel hard-packed snow and ice off the pavement with a motor truck and center scraper? "Can't be done," you say? But it can be done—with a Walter Snow Fighter, equipped with Walter Center Scraper. The same wonderful Four-Point Positive Drive that has made this unit famous for its work in deep snow, makes it unequalled for scraping. Automatic Lock Differentials, Suspended Double Reduction Drive, High Ground Clearance, Tractor Type Transmission and other features insure smooth, steady scraping action. You can apply safely the exact pressure needed. Blade trips over road obstacles without damage to road, truck or scraper. So flexible that it is easy to wind in and out of traffic and avoid delays. Think what you could do for your community with a Walter Snow Fighter.



EQUIP YOUR ASPHALT PLANT with a MADSEN PUG MILL



MADSEN mixers have a reputation for longer life and faster operation. They mix and discharge faster. Mixer wearing sections and paddle tips made of high-test white iron. Broad-faced steel cut tooth timing gears. Mixer shafts of high tensile steel and real built-in value assure the operator of the lowest possible operation cost. Horse-power requirements are low because these mixers are scientifically designed.

500 lb.—1000 lb.—1500 lb.—2000 lb.—3000 lb.—4000 lb.—and 6000 lb. capacities.

The MADSEN PUG MILL is the one you need on your job.

MADSEN

IRON WORKS

HUNTINGTON PARK, CALIFORNIA

WALTER MOTOR TRUCK CO.

1001-13 IRVING AVENUE, RIDGEWOOD, QUEENS, L. I., N. Y.

Unusual Arch Bridge On U. S. 40 Relocation

(Continued from page 2)

along the arch, and were all braced laterally and transversely with 2 x 6 lumber. They were carried on 8 mud sills with 8 x 8 cap sills at the top. The joints, all cut to radius, were 2 x 10-inch lumber spaced 20 inches on center to which the 1-inch sheeting was nailed and then the 1/4-inch oiled plywood. The top of the back forms were rough 1-inch boards with double 2 x 6 wales tied to the bottom forms with Richmond Tyscrus.

The arch is reinforced top and bottom with mats having bars on 8-inch centers with cross bars on 2-foot centers. The reinforcing from the footing wall is extended 50 diameters into the haunch of the arch or 3 feet 8 inches for the 3/4-inch round bars which were used.

Concreting and Curing

For pouring the footings the contractor built a runway level with the top of the rock immediately over the full length of the footing with a cross runway at the center, forming a large H. When pouring the arch sections a platform was built out from the west side for the concrete buggies.

The aggregates and cement were batched at the nearby permanent plant of the Arundel Corp. and hauled by ten to twelve 2-batch trucks to a side-hill hopper supported by sections of old piles and with piles for stringers for the approach deck. The batches were dumped directly to one of three Blaw-Knox 2 1/2-yard truck mixers. Water for the mixers was supplied by a Novo pump located on the bank of the old stream bed and pumping to a large tank on the same platform as the batching dumping hopper. The truck mixers had to move their load only about 200 feet to the end of the runway and then dumped into a hopper with a gate at the bottom so that the five steel-tired concrete buggies could be loaded as desired. All of the concrete was vibrated in the forms with three Syntro vibrators powered with Briggs & Stratton gas engines.

The outside forms were stripped from 3 to 4 days after pouring and the concrete immediately covered with burlap over which a continuous stream of water was run for 7 days after the date of pouring. The inside forms were usually removed within 7 days, but had to await a report from the Roads Commission Laboratory in Baltimore that the test cylinders showed a strength of 2,500 pounds per square inch before the contractor was permitted to strike the inside forms.

Quantities and Backfill

The major quantities involved in the Principio Creek Bridge were as follows:

Stream change excavation.....	7,700 cu. yds.
Structure excavation.....	5,100 cu. yds.
Class A concrete, above spring line.....	800 cu. yds.
Class B concrete, footing.....	578 cu. yds.
Reinforcing steel.....	114,600 lbs.
Stone backfill.....	150 cu. yds.
Tamped backfill.....	1,590 cu. yds.
Sand and gravel backfill.....	260 cu. yds.
Dry riprap.....	600 sq. yds.

The plan required a 2 to 1 fill on the inside of the structure against the arch beginning at a point 20 feet from the center line of the stream and 1 foot below the spring line of the structure which is 30 feet from the center line of the stream. The stone backfill on the back of the arch is 1 foot thick and carried 7 feet vertically on the arch. From this point to the top of the arch is a sand and gravel backfill 1 foot thick. The tamped backfill starts 1 foot back of the abutment and is carried vertically to intercept the original ground surface and then horizontally over against the sand and gravel backfill. This was all tamped

with a pneumatic tamper.

Dry riprap was placed 375 feet upstream along the northeast bank and around the northwest wing.

Waterproofing and Other Items

A 16-ounce copper stripping was placed as water buffing in the wing wall in conjunction with rubber expansion joints, which are 1 inch thick, at the point where the wing changes to a 45-degree angle with a line parallel to the spring line.

A 3-ply membrane was placed over all construction joints at the spring line and at the top of the arch and the entire arch was waterproofed by painting with Hunt Process blended asphalt.

Weep holes consisting of 4-inch cast iron pipe were placed at 15-foot centers along both sides of the structure at the junction of the abutment and the arch ring and the counterforts. An impervious clay base was tamped in place along the entire length of the structure immediately below the weep holes so that all of the water collected by the

pervious backfill would drain to the weep holes.

Labor and Personnel

On this structure the contractor, C. J. Langenfelder & Son of Baltimore, Md., used twelve carpenters with twelve

laborers and eighteen men in the concrete crew. For the contractor the work was done under the direction of W. C. Whittaker as Bridge Superintendent, and for the Maryland State Roads Commission, W. D. LeFevre was Resident Engineer.

SCHINCK TRACTOR LOADER

A mechanical loader to be used on most row-crop type tractors.

—Used for loading—

Sand, gravel, dirt, snow

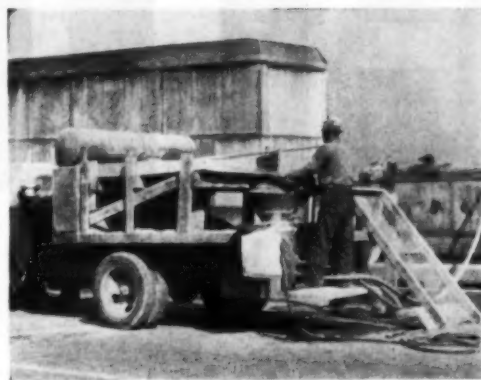
\$275 f.o.b.

Write for literature.

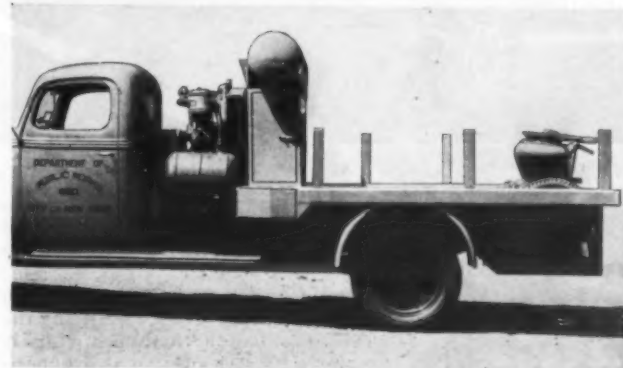
J. A. SCHINCK & SON

Manufacturers

MEADOW GROVE, - NEBRASKA



Shown above repairing the Westinghouse Bridge in East Pittsburgh, Pa., the Cretemobile is also widely used for new and repair work on dams, reservoirs, building construction, etc. Men, tools and all equipment are transported on the same unit. Almost all "set-up" expense is eliminated, making possible the use of Gunite on small jobs as well as large. The Cretemobile solves today's problem of how to do the best construction work in the least time.



The Hercules Cretemobile is a complete, compact, mobile truck unit built specifically for the application of Gunite. Unit is so designed that the truck motor operates the air compressor through a Hercules Split Shaft Power Take-off. Air compressor furnishes air pressure for the water tank, (shown at front of body, above tool box) air motor and Cement Gun. The Cement Gun is easily removed from the Cretemobile chassis, and may be operated as far from chassis as deemed practical by the operator. Write for literature.

HERCULES STEEL PRODUCTS CO.

GALION, OHIO

Effective Ice Control Is Year-Round Job

Cleaning of All Sub-drains And Ditches in Autumn Prepares for Cold Weather; Cinders Fight Ice

By FRANK F. SCRIVENER, JR.,
Maintenance Engineer,
Maryland State Roads Commission

† The Maryland State Roads Commission, due to the state's changing terrain from the Tidewater sections of the eastern shore to the mountains of western Maryland, is faced with varied problems in keeping its 4,300 miles of road open and safe for motorists during the winter season. Maryland's geographical location, together with the fact of its proximity to the National Capital, requires many of its roads to serve as main arteries of travel between the north and south. To meet effectively this responsibility for safe winter travel, a well-planned program is required, together with sufficient equipment handled by a properly organized personnel.

At present Maryland is divided into six Maintenance Districts ranging from 500 to 900 miles under direct supervision of a District Engineer, assisted by a Maintenance Engineer. Each district comprises three or four counties, in each of which is located a Resident Engineer, who personally directs all maintenance operations. This engineer is the key man in the organization, because upon his ability to produce depends the condition in which the public finds the roads during the various seasons.

To most of our northern neighbors, Maryland is considered one of those states free from winter's icy blasts; yet, Weather Bureau records show our state has an average snowfall of 24 inches per season. The far western section during the winter 1935-36 had a snowfall of 126 inches and averages a 70-inch snowfall over a 45-year period.

During the winter of 1939 and 1940 the Commission spent a total of \$142,567 in snow-removal operations and \$72,465 in ice-control work.

Snow Removal Important

We have found that efficient snow re-

moval is a major factor in ice-control work, since snow, no matter how light, if allowed to pack under traffic becomes difficult to remove and dangerous to travel. This Commission has distributed throughout the state 282 2 to 4-ton trucks, equipped with high-speed pusher-type plows, averaging one plow to every 16 miles of road. In addition, 14 rotary and 33 V-type plows mounted on heavy-duty trucks and motor graders supplement the lighter equipment. About 200 miles of snow fence is erected annually to prevent drifting.

All plows begin operation as soon as the roads are covered with snow, with the blades of the plows placed right down on the road surface. Caster wheels and shoes simply steady the moldboard. While this may seem to be a costly



One type of spreader used for ice control in Maryland.

method of operation due to possible damage to pavement surfaces or too frequent replacement of blades, it is justified in our opinion by the miles of clean pavement obtained. Each snowplow unit

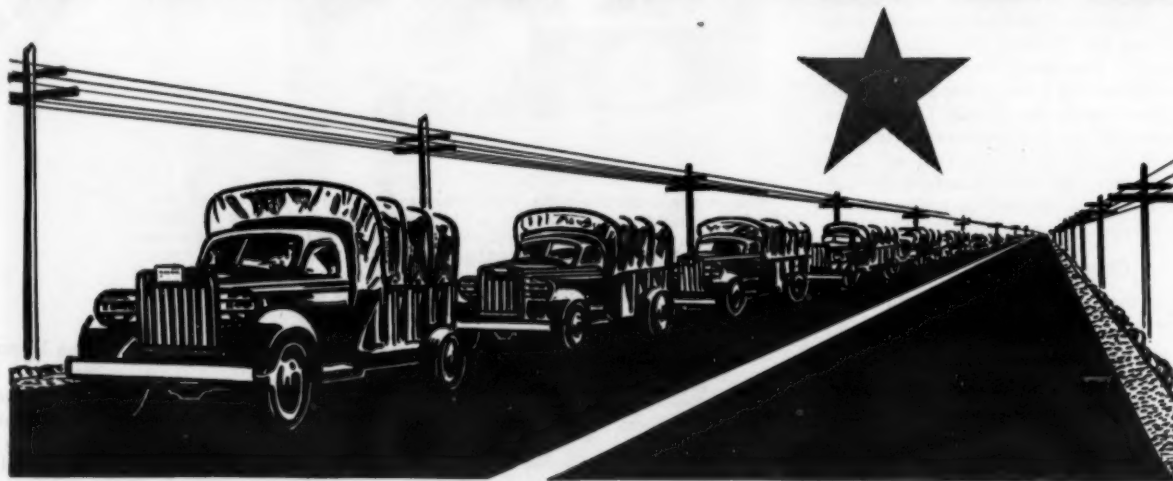
is operated on a predetermined route, one with which the driver is thoroughly familiar. Only in case of emergency is his route changed. After pavement surfaces have been cleaned, the plows push the windrowed snow back to the ditch line. This allows room for any subsequent snow which may fall and in addition prevents melting snow from running on the surface of the road with the probability of its freezing. Snow as snow is no longer a bugaboo, but when snow or rain becomes ice, the wheel trouble starts.

Ice Prevention

Effective ice control is the result of year-round work. Beginning in the autumn, all depressions in pavement surfaces capable of holding water, which later may result in ice, are eliminated. Earth shoulders are bladed and shaped in order to insure maximum drainage. Appearance of surface water seeping through the pavement calls for immediate investigation and correction. Out-

(Concluded on page 33)

AMERICA SWINGS INTO ACTION



RED DEVIL
LIGHT
and POWER PLANTS
800 to 50,000 WATTS



3,000 WATT
as
illustrated **\$395⁰⁰**
on
Pneumatic Tires

Finish the job quicker and save money with electricity.
Send for catalog describing generators and our complete line of portable poles for floodlighting.

E. B. KELLEY CO., Inc.
43-47 Vernon Blvd.
Long Island City, N. Y.



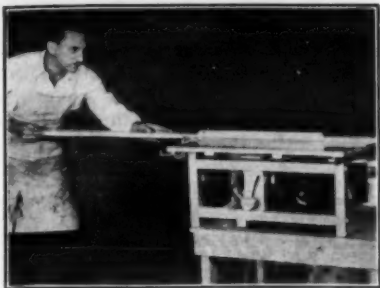
The construction of airport, cantonment and industrial paving is of vital importance in America's swiftly moving defense program.

Engineers and contractors with urgent time schedules to meet are finding the facilities of The Barrett Company highly valuable. Barrett—along with its experi-

ence in successfully solving similar problems during 1914-18—has the personnel and equipment to speed defense construction. These resources include specially trained highway engineers, a fleet of Barrett tank cars and efficient Tarvia distributors. Barrett is ready for emergencies!

THE BARRETT COMPANY New York Chicago Birmingham St. Louis Detroit Philadelphia Boston Providence Lebanon, Pa. Rochester Baltimore Minneapolis Cleveland Columbus Toledo Youngstown Syracuse Hartford Buffalo Cincinnati Bethlehem Portland, Me. Norwood, N. Y.
In Canada: THE BARRETT COMPANY, LTD. Montreal Toronto Winnipeg Vancouver

... ONE OF AMERICA'S GREAT BASIC BUSINESSES



The Paxson portable woodworker.

Portable Woodworker For Cutting Forms

Among the tasks for which the new portable Buildsaw woodworker can be used on construction jobs are cutting lumber for forms, wooden sign making and woodworking in state, county and township highway department shops as well as in contractors' shops. The Buildsaw is designed for easy portability around the job or shop and can be used where larger machines would be impractical.

The top and frame are of durable steel-tied wood construction, making it light enough for one man to load into the back of a car or truck. All parts subject to wear are of iron or steel; a 24 x 30-inch top accommodates standard-size building lumber; and its weight with the motor is about 100 pounds. With 110-volt motors from 1/2 to 1 hp, this machine will rip, cut off, mitre, groove, dado, etc. The 10-inch saw blade cuts to a 3-inch depth. To facilitate angle or bevel ripping, a special tilting fence is available. Features include an SKF ball-bearing arbor, an 8 or 10-inch Atkins saw blade, V-belt drive, steel mitre gage and ripping fence with milled steel tracks. The saw guard is counterbalanced by a spring. A rigid screw type assembly raises and lowers the saw arbor.

Bulletin C-11, describing and illustrating the Buildsaw, which is available ready to run or can be furnished as a kit of parts to be assembled with hand tools by any carpenter, may be secured by those interested direct from the Paxson Co., Dowagiac, Mich., by mentioning this item.

New Tractor Catalog

A new catalog, printed in three colors and devoted entirely to the 80-hp diesel D7 tractor, has just been issued by the Caterpillar Tractor Co., Peoria, Ill. Cut-away pictures show cross sections of the engine and the tractor chassis, while the accompanying text gives a complete description of all working parts. Separate sections of the book are devoted to the fuel system, general engine construction features, the lubricating system, etc. Other photographs show some of the precision methods used in the manufacturing of the machine.

Copies of this catalog, Form 6289, may be obtained direct from the manufacturer by mentioning this item.

FINISHING MACHINES

JOINT INSTALLING MACHINES

Flexible Road Joint
Machine Co.
WARREN, OHIO

New 107-hp Diesel For Heavy Trucks

A new Mack-Lanova diesel engine, developing 107 hp at the maximum governed speed of 2,200 rpm and designed for installation in 4-wheel truck models of the 24,000-26,000-pound gross vehicle weight range, has been announced by Mack Trucks, Inc., Long Island City, N. Y. This Model END-405 is a smaller edition of the Model END-605. The latest model has a piston displacement of 405 cubic inches and a bore and stroke of 4 x 5 3/8 inches. It employs the well-known Lanova system of controlled combustion and develops unusually high power and economy while operating at moderate compression and fuel injection pressure.

All lubrication passages are rifle-drilled out of solid iron, no tubes or piping of any kind being used. The oil filter is built on to the crankcase and uses no external connections. Aside from the water pump, fan and generator, which are driven by the conven-

tional triangular double V-belt, all timing and accessory drive is through a train of helical gears which are upset end-grain drop-forgings, case-hardened and generator ground.

New Gar Wood Dealers

Announcement has been made by the Hoist & Body Division, Gar Wood Industries, Inc., Detroit, Mich., of the ap-

pointment of the following new distributors of Gar Wood hoists and bodies in their respective territories: W. T. Stringfellow & Co., 125 12th Avenue, No., Nashville, Tenn.; Southern Equipment & Tractor Co., Inc., P. O. Box 1892, Monroe, La.; Oden Equipment Co., 312-24 No. 4th St., Albuquerque, N. M.; and the Fruehauf Trailer & Equipment Co., 1943 4th Ave., So., Seattle, Wash., and 906 N. E. 3rd Ave., Portland, Ore.



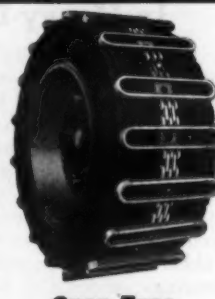
Closed Type

WARCO J & S TRACTION TREADS

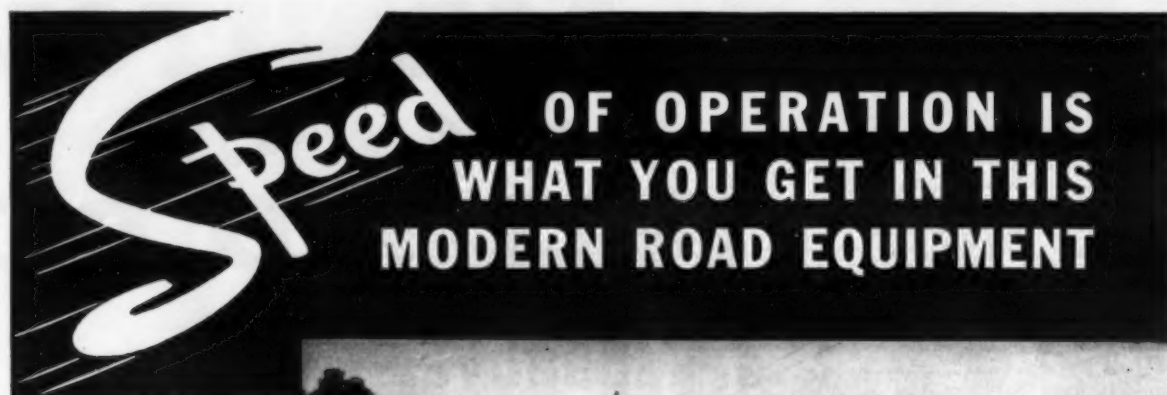
NOW AVAILABLE WITH
CLOSED or OPEN Type SHOES

Over ice, snow, sand, loose ground or mud, your trucks will come through if equipped with J & S Traction Treads. Write for circular.

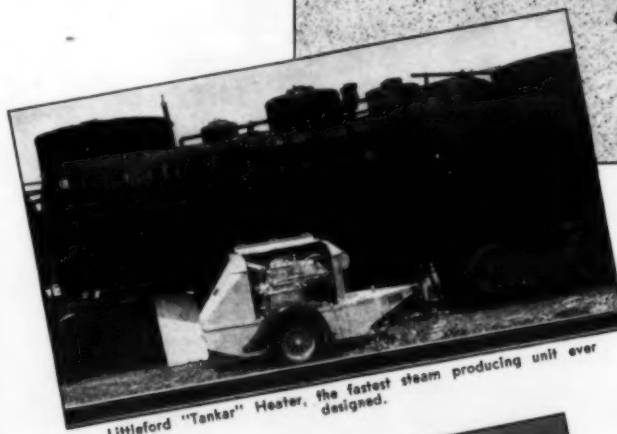
W. A. RIDDELL CORPORATION
Bucyrus, Ohio



Open Type



BUILD MORE
DEFENSE ROADS
IN LESS TIME



Littleford "Tanker" Heater, the fastest steam producing unit ever designed.



Littleford Two-Way Broom with 60-second change over.

Here are the units that have been Engineered and Designed to give you the Speed needed for fast road building and maintenance.

Pressure Distributor—This Littleford Spray Master Pressure Distributor has only one valve for operating the spraying of materials. No gadgets—no maze of valves to slow up operating time.

"Tanker" Heater—This is the fastest steam producing unit ever designed—produces 200 lbs. of steam in 2 minutes, heats one or two tank cars in 1/3 less time than ordinary units. Can also be used as a cleaning outfit.

Road Broom—This two-way Broom can be changed to sweep from one side to the other in 60 seconds—has hydraulic lift to raise or lower broom giving the broom any required tension on the road.

We need speed today—so speed up your work with a unit guaranteed to give speed of operation.



LITTLEFORD

LITTLEFORD BROS.
485 E. Pearl St., Cincinnati, Ohio



The Model K-11 International truck.

Five Truck Models In Heavy-Duty Class

Five new heavy-duty truck models are now being shipped from the International Harvester works at Fort Wayne, Ind., according to reports from the Chicago office of this manufacturer. These models include new styling, new foam-type, sponge-rubber seat cushions; easier steering; new, improved frame construction; larger, easier-riding springs; new rubber-mounted propeller shaft center bearings; wider and deeper cross-members; new engine features; new Hi-Tork hydraulic brakes; and quicker-acting air brakes.

The carrying capacities of the new models, including pay load, range from 10,000 to 18,000 pounds with the gross vehicle weights from 14,500 to 27,000 pounds, and wheel bases from 134 to 197 inches. The five new models are powered by five sizes of 6-cylinder, valve-in-head, replaceable-cylinder engines, ranging from 84 to 114 hp.

Important to reducing fatigue in truck operation is the fact that steering effort has been reduced as much as 50 per cent. The king-pin inclination has been reduced from eight degrees to four degrees, and the use of twin-lever steering gears gives better leverage. In addition, all models have ball bearings at the upper end of the steering wheel tube, and the three larger models have tapered-roller bearings in the steering gear.

Diesel Engines Described In Two New Bulletins

The newest addition to the line of Cummins diesel industrial engines is the Model AS, a supercharged development of the standard 6-cylinder Model A. By means of supercharging this Model, its horsepower has been increased approximately one third, 100 to 135 hp, without increasing the weight except for the addition of the supercharging unit.

This and other models of diesel industrial and truck engines are described and illustrated in bulletins No. 5182 and No. 5179 respectively, recently issued by the Cummins Engine Co., Columbus, Ind. Copies may be obtained by writing direct to the manufacturer and mentioning this item.

PILE HAMMERS and EXTRACTORS HOISTS-DERRICKS WHIRLERS

Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs.

McKIERNAN-TERRY CORP.
19 Park Row, New York
Distributors in Principal Cities

New Bulletin Describes Longitudinal Finisher

The Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis., states that the use of its longitudinal finisher assures contractor and engineer alike that the finished surface is as specified. Errors in slab thickness are immediately detected; form settlement at the joints is equalized; finishing operation is performed at the proper time, after initial set has occurred; density of the concrete is maintained; and paver production speed can be matched.

All of these features and others are described by means of action photographs and text in a bulletin recently issued by this company from which copies may be obtained by those interested by mentioning this item.

Bucket-Handling Unit

For jobs where hand labor is used for handling materials, the Pioneer Engineering Works, Inc., 1515 Central

Ave., Minneapolis, Minn., has designed the new Pioneer Trukbukit, a complete machine for handling buckets. It picks them up from ground level, or below grade, carries the load on the truck ahead of the rear axles or behind the truck, and can set down the loaded bucket, or

dump the load and spread it.

Complete construction data, specifications, and photographs of a few typical jobs are contained in a catalog, Form 535, recently issued by this company. Those interested may obtain copies direct from the manufacturer.



A Quality AIR HOSE at a MODERATE PRICE

Indifferently made air hose becomes brittle and flaked under the heat and lubrication of a compressed air tool. Too often it does not give fair warning of failure. . . . It just gradually slows down the hammer or drill and increases your operating costs before you realize it.

Goodall, however, is able to offer you '37 Brand, a high grade moulded and braided air hose in continuous lengths to 500' at prices that will amaze you when you examine the quality. '37's oil resisting tube will live as long as the job lasts . . . and longer. Its 'walls' can be bent and twisted but it will not kink. Its smooth black cover slides over the roughest going and stands up proudly.

Write today for table of weights, working pressures, sizes and attractive prices.

GOODALL

RUBBER COMPANY, Incorporated
2 S. 36th St. PHILADELPHIA, PENNA.
New York, Boston, Trenton, Pittsburgh, Chicago, Houston, Los Angeles, San Francisco, Seattle, Salt Lake City and Distributors in Principal Cities.

MANITOWOC

use  **WELDED DIPPER**

on their
SPEEDSHOVEL



● Manitowoc Model 3000 coal stripping shovel. 35-ft. boom 27-ft. dipper stick equipped with 1 3/4 yd. PMCO dipper.

● Manitowoc Model 3500 coal stripping shovel. 45-ft. boom and 34-ft. dipper stick equipped with 2-yard PMCO dipper. Handling rock and clay overburden.

● The Manitowoc Engineering Works, in building long boom stripper shovels, have adopted PMCO streamlined welded dippers to gain greater efficiency and capacity.

THE PMCO welded dipper is a necessity today in "up to the minute" shovel designing. Engineers have pared down excess weight all over the modern shovel to speed up production. So why tolerate a heavy solid cast type dipper that is wasting power and cutting down capacity without adding anything to strength.

The PMCO Welded Dipper may increase production up to 30%—with no increase in labor or power costs. Tested in the field under toughest conditions, the PMCO dipper is now approved and used by many leading shovel manufacturers. Our manufacturing facilities assure prompt deliveries.

2-yd. PMCO welded dipper
The modern weight saving dipper for the modern weight saving shovel.

We operate the largest and most complete manganese Steel foundry in the United States

PETTIBONE MULLIKEN CORPORATION

Established 1880

4710 West Division Street, Chicago, Illinois

Shovel Company Names New District Manager

Announcement has been made by the Link-Belt Speeder Corp., Chicago, of the appointment of Horace L. Niles as District Manager for the Pacific Northwest. Niles, who has represented another well-known shovel manufacturer in the same territory, recently spent two weeks at the Cedar Rapids and Chicago plants of the Link-Belt Speeder Corp. and is now back in his territory where he will make his

headquarters at the Howard-Cooper Corp., East Third & Hawthorne Sts., Portland, Oregon.

1941 Catalog Describes Earth-Moving Equipment

A new 48-page pictorial catalog covering the complete 1941 line of LeTourneau tractor-drawn earth-moving equipment has just been issued by R. G. LeTourneau, Inc., Peoria, Ill. The entire line of Carryall scrapers, bulldozers, An-

gledozers, Rooters, sheepsfoot rollers, tractor cranes, power control units, Tournapulls, Tournatrails and Tournacar welders is pictured and described. Complete specifications of each unit are given together with its application. The working features of the different machines are described and illustrated by pictures and diagrams.

Copies of this 1941 catalog may be secured without obligation by interested contractors and engineers direct from the manufacturer. Ask for Form A-11.

Rome Grader Bought

By Union Fork & Hoe

The business of the Rome Grader & Machinery Corp., 1212 East Dominick St., Rome, N. Y., has been sold to The Union Fork & Hoe Co. of Columbus, Ohio. Rome graders and allied lines will still be manufactured at the same location and the present personnel will be retained, but the unit will be known as the Rome Grader & Machinery Division of The Union Fork & Hoe Co.



YOUR PAVING TEAM FOR '41

CONCRETE SPREADERS BLAW KNOX

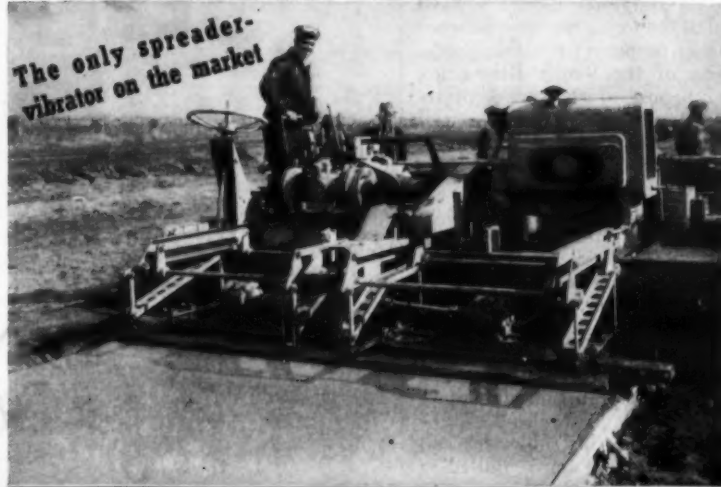
- If you want to step up your paving production for maximum yardage and profits, get this winning team on your side.
- *Mechanized Production Units* - the new Blaw-Knox CONCRETE SPREADER and the new Blaw-Knox Model "X" FINISHING MACHINE, working together or separately, are today's most widely discussed developments in the paving industry.
- Either machine can be equipped with *vibration* - the most modern and practical vibrating equipment on the market.
- *Sure* - we'll be glad to tell you about this famous paving team for wide and narrow pavements. Ask about the movies that show this winning team in action on concrete slab construction.

BLAW-KNOX DIVISION

of Blaw-Knox Company

Farmer's Bank Building - Pittsburgh, Pa.

Offices and Representatives in Principal Cities



VIBRATORS

For high speed production
and high quality finish

ROAD FINISHERS



BLAW-KNOX BINS AND BATCHERS • ROAD FORMS • STREET FORMS • CONCRETE SPREADERS • TAMPING ROLLERS • VIBRATORS
CONCRETE BUCKETS • CLAMSHELL BUCKETS • TRUCK MIXERS • STRIPING MACHINES • TURNTABLES • ROAD FINISHERS • STEEL FORMS



C. & E. M. Photo
Cutting subgrade on the S. J. Groves
concrete paving job on N. J. Route 841.

Main Jersey Route Made Dual Highway

(Continued from page 11)

tion for both surface and subsurface drainage they are equipped with perforated corrugated-metal pipe at the bottom which takes up subsurface water from the sub-base material and allows it to flow into the cast-iron drainage system. Even though this is very flat country there should be no trouble from ponding in low spots along this highway immediately following heavy rains as the inlets are placed not only at the bottom of all grades but also part way up the grades, enabling them to function more effectively.

For mixing the concrete for setting inlet castings and for furnishing other odd lots of concrete as required, the contractor used a Ransome 10-S mixer.

Final Grade and Forms

A Warco grader powered with an International Harvester engine worked just ahead of the forms and also between the forms in preparing the fine grade. The setting of the 9-inch Blaw-Knox steel road forms, which were kept remarkably clean at the rail head as well as around the stakes and the entire length of the base, was handled by a boss form setter with four men. A heavily loaded subgrader, running on the forms for the initial 10-foot strip of 9-inch uniform thick paving or on the initial slab and one form, was pulled by a 5-ton roller. It was equipped with dumping handles at each side so that when it was full of excess dirt cut from the subgrade it could be dumped quickly, leaving the dirt in one place for the grade crew to shovel out. Three men worked behind this subgrader and then three additional men pulled a lighter cutter by hand, cleaned out behind it and then used a lawn-type hand roller for the final compaction of the grade. Behind this crew came two men with the final checking scratch-board.

Expansion Joints

With the paver running outside the forms for both 10-foot concrete lanes, the contractor was able to set the expansion joints well ahead of paving. As this involved the assembly of the standard New Jersey beam-type joint with $\frac{3}{4}$ -inch expansion material and ten

beams running through the expansion material, each one painted with red lead from end to end and oiled, the two men setting the joints needed the time and space available ahead of the paver. Each of the joints was securely clamped to the base of the steel road form at each end for the initial slab and on the outside for the second lane. These joints are set so that the top of the joint is $\frac{1}{2}$ inch below the top of the pavement, leaving the joint 1 inch wide to be filled with asphalt after the pavement was cured. The RA2 asphalt for the joints was prepared in a new Littleford asphalt kettle with fuel oil torch and then poured with cylindrical hand pouring pots having a conical pouring spout which practically eliminated all spilling of asphalt on the concrete when pouring the joints.

When pouring the second 10-foot lane of concrete a $\frac{3}{4}$ -inch asphalt-impregnated felt was laid against the side of the initial lane of concrete and held in place by a continuous clip and wires which had been cast in the first lane



C. & E. M. Photo
New Jersey's standard beam-type expansion joint.

of concrete by placing them against the inside form.

The expansion joints are spaced uniformly 56 feet 4 inches apart.

The Batching Set-Up

The batching plant, stockpiles and cement storage sheds were set up in a level borrow pit about one acre in extent located about $\frac{1}{2}$ mile from the north end of this 7-mile paving contract. All aggregates and the cement were hauled to this site. The sand was hauled 9 miles from a commercial pit by two Ford and one International trucks hauling 8 tons per load. These and all other trucks used on the job were hired by the contractor who placed his own drivers on them.

The gravel was delivered by barge to a dock 6.6 miles from the batching plant where a Link-Belt crane with a $1\frac{1}{4}$ -yard Hayward bucket unloaded the barges continuously to a 70-ton Blaw-Knox bin from which the four Sterling Cummins-diesel-powered trucks were loaded with 12 yards of gravel per load.

The sand and gravel trucks unloaded onto large stockpiles built up on planked areas about the batching plant. The materials were loaded into the 110-ton

(Continued on next page)

THIS YEAR

I'm Buying What We've Always Needed

» A **"99" POWER GRADER**



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Below: Typical "99" Power Grader operations. The "99" alone can do the entire road building and maintenance job from bank to bank.



● Talk to anybody who has seen this unmatched performer in action . . . engineers . . . contractors . . . federal, state and county officials . . . and you'll understand why A-W "99" POWER GRADER sales are skyrocketing.

In all kinds of competitive demonstrations . . . month after month on the widest variety of construction and maintenance work . . . in locations where ordinary motor graders can't even travel . . . the A-W "99" has proved the superiority of All-Wheel Drive and Hydraulically Controlled All-Wheel Steer.

Before you buy any equipment see an A-W "99" put through its paces. See it handle more work in the same time. See how many places and times it keeps going when other equipment is stalled on the side line. Check the savings it makes by reducing your investment in other machines. You, too, will say "there's the machine we've always needed." And performance records of the "99" for months and years to come will back your judgment. THE AUSTIN - WESTERN ROAD MACHINERY CO., Aurora, Illinois.

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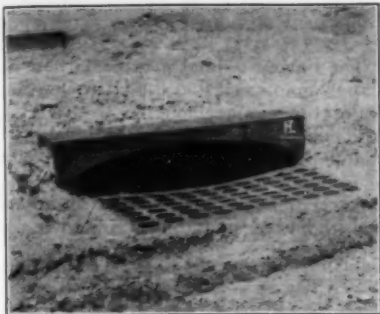
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C. & E. M. Photo
The type of drainage casting used for the 278 inlets on the S. J. Groves 6.98-mile concrete paving contract.

Snappy Work Speeds Road Widening Job

(Continued from preceding page)

Blaw-Knox weighing batching plant by a Lorain 77 crane powered by a Caterpillar diesel engine and with a 55-foot boom and 1½-yard Blaw-Knox clam-shell bucket. The dry weights of the batches loaded by this plant were:

¾-inch gravel.....	1,400 pounds
1½-inch gravel.....	1,168 pounds
Sand	960 pounds
Cement	7 bags

The cement in bags was delivered by rail to a siding at Tacony, Pa., where three men unloaded the cars to two semi-trailers hauling 400 bags per load. The haul was 8 miles one way from the siding to the batch plant site. The batch trucks pulled up behind the trailer parked near the batching plant and four men loaded the 7 bags of cement into each of the three compartments in each truck body. To provide against delays in delivery, a storage platform capable of holding 500 bags of cement and covered with tarpaulin was provided near the batching plant. In addition a separate shed was built for storing the empty bags before they were returned to the cement manufacturer.

The batch trucks were all Ford and Chevrolet trucks and the fleet varied from six at a maximum down to three when the paver was working past the batching plant.

Work Around the Paver

The smooth operation of the batching plant and the good organization around the paver make the average day's work of 1,800 feet of 9-inch concrete 10 feet wide laid down and finished in 9 hours readily understandable. This figure was passed many times, with a maximum of 1,968 feet in one 9-hour day. As the trucks with the dry batches backed up to the Ransome 27-E dual-drum paver, they wasted no time as the skip of the paver was heavily reinforced on the outside and on the inside was a heavy stop against which the trucks backed, eliminating the damage to the skip noted on so many concrete jobs when over-zealous truck drivers back in too far. The man responsible for dumping the trucks lost no time in getting the batches into the skip and the truck out. Two men immediately emptied the bags of cement into the skip and one man picked up the empty bags and baled them at the roadside. The mixing of the batches, controlled automatically by pre-setting the timer of the dual-drum paver, was 60 seconds in the first drum and 50 seconds in the second drum. With careful control of the water a slump lying well within the specified 1½ to 1¾ inches was maintained.

Water for the batches was supplied by two 1,000-gallon tank trucks, one of which was towed behind the paver by a cable, and the water was taken from a connection at the rear of the tank and pumped to the paver tank by a 2-inch Novo centrifugal pump mounted on the operator's side of the machine. This method saved pumping water 4½ miles

from the end of the job. The tank trucks were filled from a city hydrant in Moorestown, beyond the north end of the contract.

The paver operator showed unusual skill in spreading the batch across the 10-foot space between the forms rather than the usual method of spreading up one side or the other against the forms. Two pit men, or puddlers, completed the spreading of the concrete and then two men with a heavy strike-off tamped the concrete to 2 inches below the tops of the forms, placed the tied bar mats on the concrete, and went back and pounded them down with the strike-off at each transverse bar. The same two men then used a Master vibrator along each edge and around the reinforcing at the expansion joints.

The concrete for covering the bar mat and providing the top 2 inches of the slab was spread rapidly across the top from the concrete bucket and then worked into position and finished by the Blaw-Knox gas-mechanical double-

(Concluded on page 38)

Ransome 34^E "SINGLE DRUM" PAVERS



A foremost contractor (owner of the paver shown above) writes "This machine is fast and very efficient"—"We heartily endorse this paver." This letter is in our files. Get all the facts on this up-to-the-minute paver. Modern from boom-tip to skip . . . efficient and built to last.



RANSOME CONCRETE MACHINERY COMPANY
DUNELLEN, NEW JERSEY

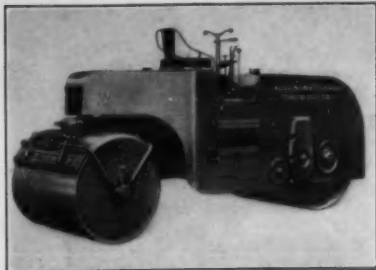
MICHIGANS

Keep 'em ROLLING!

High speed dirt-handling requires keeping the trucks moving! Fast-working MICHIGAN Mobile SHOVELS "keep 'em rolling"—Fingertip Air Controls, plus over-the-front loading, enable operators to dig, swing and load in a hurry! Uninterrupted, low-cost performance comes from MICHIGAN'S advanced design and rugged construction throughout. When moving to another location MICHIGAN'S 25 m.p.h. road speed puts it on the job, and at work, in shorter time than less mobile machines can be moved! You will be interested in complete information on these modern, money-making MICHIGANS. Bulletin C-13 shows how MICHIGAN Mobile SHOVELS, quickly convertible for Crane, Clam, Dragline or Trench Hoe Work, could "keep 'em rolling" for you—write for it TODAY!



MICHIGAN America's Mobile Shovel-Crane Specialists
MICHIGAN POWER SHOVEL CO.
BENTON HARBOR MICHIGAN



The improved A-W tandem roller.

New Tandem Rollers Work Closer to Curb

Excessive overhang and the position of the roller operator in many cases prevent tandem rollers doing a good job close to the curb, unless chances are taken that the curb itself may be damaged. The new tandem roller announced by Austin-Western Road Machinery Co., Aurora, Ill., features better visibility so that the operator can see closer to the curbs, and there is less frame overhang. The weights of the front and rear rolls can be increased by adding water to meet a wide variation of roller requirements ranging from 133 to 301 pounds per linear inch of roll.

Among the other advantages and improvements announced by the manufacturer are: more convenient controls with the reversing clutch lever mounted on the steering column; hydraulic steering; a lower center of gravity to prevent sway; more ground clearance under the side plates to clear higher curbs; increased stability through box-shape construction which resists twisting strains; a better balance of the engine and final-drive parts to provide uniform weight distribution across the entire rear roll; and accessibility for reaching or servicing moving parts.

The two-piece front rolls and the rear roll are of welded construction and are mounted on anti-friction bearings. The front fork with the horizontal king pin is mounted on widely spaced bearings and the large diameter vertical kingpost is mounted on Timken bearings for increased stability and smooth steering. The new roller may have either gasoline or diesel power and is equipped with a 2-speed forward and 2-speed reverse transmission with heat-treated alloy-steel gears and shafts and anti-friction bearings throughout.

Full information on this roller may be secured from the manufacturer.

New Scarifier Blade For Hard-Packed Snow

Hard-packed snow and ice, which makes roads dangerous in winter and often remain on the highway until spring, can be removed readily with the newly patented Saw-Tooth blade recently announced by the Shunk Mfg. Co., Bucyrus, Ohio. This blade can be installed in place of the regular blade on any type of maintenance or snow-removal equipment without any other change in the machine. Because of its "pick-axe" action, it is claimed that this blade cuts through where a conventional blade might stall.

One trip over an icy or snow-packed road with any type of unit equipped with this blade breaks up all ruts, irregularities and bumps, roughing up the roadway surface sufficiently to reduce the skidding hazard to a great extent, according to the manufacturer. A second trip over the road will break up the frozen material to such an extent that it thaws more readily. It is claimed that

two or more trips over the road, followed by the regular grader or snow plow, will in most cases remove the frozen material entirely.

Further information on this Saw-Tooth blade, which the manufacturer states has been used successfully by many highway departments in the snow belt, may be secured direct from the manufacturer by mentioning **CONTRACTORS AND ENGINEERS MONTHLY**.

New Barber Sales Agent

The Barber Asphalt Corp., Barber, N. J., has announced that the Highway Co., under the management of C. G. Alfs, with offices at Zionsville, Indiana, will handle the exclusive sale, within the state of Indiana, of all of its products for the construction and maintenance of streets and highways, including Trinidad Lake asphalt.

"Builders of Heavy Duty Crushing Equipment Since 1885"

Whether on Rock and Gravel Crushing or on Screening and Sizing work

you will discover that Gruendler proved Equipment is more sturdily built to perform day in and day out more economically.

In view of the large Soil Conservation Program Many Contractors operating Quarries of high grade Limestone will be interested in our Large Capacity Famous Two-in-One Lime Pulverizers.

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but a whole lot better
on the job, and on the
profit side of the ledger.
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gives you More.

NOT A DRESS PARADE!

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build the new Baltimore Airport, lined up hard
at work on this important project.

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THE **GENERAL EXCAVATOR COMPANY**, Marion, Ohio

Maryland Relocation Improves Vital Route

(Continued from page 2)

plate-girder structures consisting of three spans, the offshore spans being 119 feet 8 inches each and the center span 149 feet 4½ inches, supporting a 32-foot clear roadway and two 3-foot sidewalks. The roadway is a reinforced concrete slab with a 1½-inch bituminous wearing surface, and the balustrade for the sidewalk is of ornamental iron supported on concrete posts.

The sites of the abutments on each shore were within an area which had been filled to considerable depth with waste from a pulp mill. To prevent lateral movement of the structure from the pressure exerted by the approach fill against the abutments, 30,000 cubic yards of the waste was removed and replaced with a selected backfill composed of run-of-bank gravel having not more than 10 per cent clay content. The contractor was required to complete the backfill in the abutments before driving any piles in the abutment foundations. The entire structure was founded on piles driven to a predetermined elevation (-21.5) which gave about 20 feet of pile below cut-off. The piles had a bearing of 30 tons at this elevation.

The structure over Principio Creek, Contract Ce-222, is described in some detail in the accompanying article.

The crossings of Northeast Creek, Contract Ce-209, are identical bridges of continuous beam design, founded on a hard gravel material well below danger of scour. The spans are 41 feet, 51 feet, and 41 feet, with 30-inch 116-pound I-beams for the exterior girders and 24-inch 87-pound I-beams for the interior girders. Over Little Northeast Creek (Ce-209) the dual bridges are continuous beams of three spans of 34 feet, 42 feet, and 34 feet respectively. The exterior girders are 27-inch 91-pound I-beams and interior girders 24-inch 74-pound I-beams. On both crossings there is a 32-foot roadway between curbs, two 3-foot sidewalks, and a 1½-inch bituminous wearing surface on the reinforced-concrete slab. A concrete balustrade was constructed at the back of the sidewalks.

The necessary drainage structures on the project ranged from a 15-inch pipe

culvert to a double 21-foot x 13-foot reinforced-concrete box culvert. Pipe culverts were used for all drainage areas requiring an opening of 12 square feet or less, while for openings requiring more than 12 square feet, box culverts or bridges were constructed.

These structures required a total of 63,000 cubic yards of excavation of all classes, 984 tons of reinforcing steel, 1,650 tons of structural steel, and 16,150 cubic yards of concrete.

Grading

Exclusive of the Susquehanna Bridge and its approaches, the relocation required 1,409,325 cubic yards of excavation, 524,250 cubic yards of borrow, and 457,385 square yards of paving. The average unit price for grading was \$0.23 per cubic yard; for borrow, \$0.26 per cubic yard; and for reinforced concrete pavement \$1.99.

Highway excavation on all contracts except Ce-215 and Ce-214 was done by scrapers. This equipment included Gar Wood scrapers hauled by Allis-Chalmers



Identical bridges of continuous beam design provide the crossing of Northeast Creek on the relocated section of U. S. 40 in Maryland.

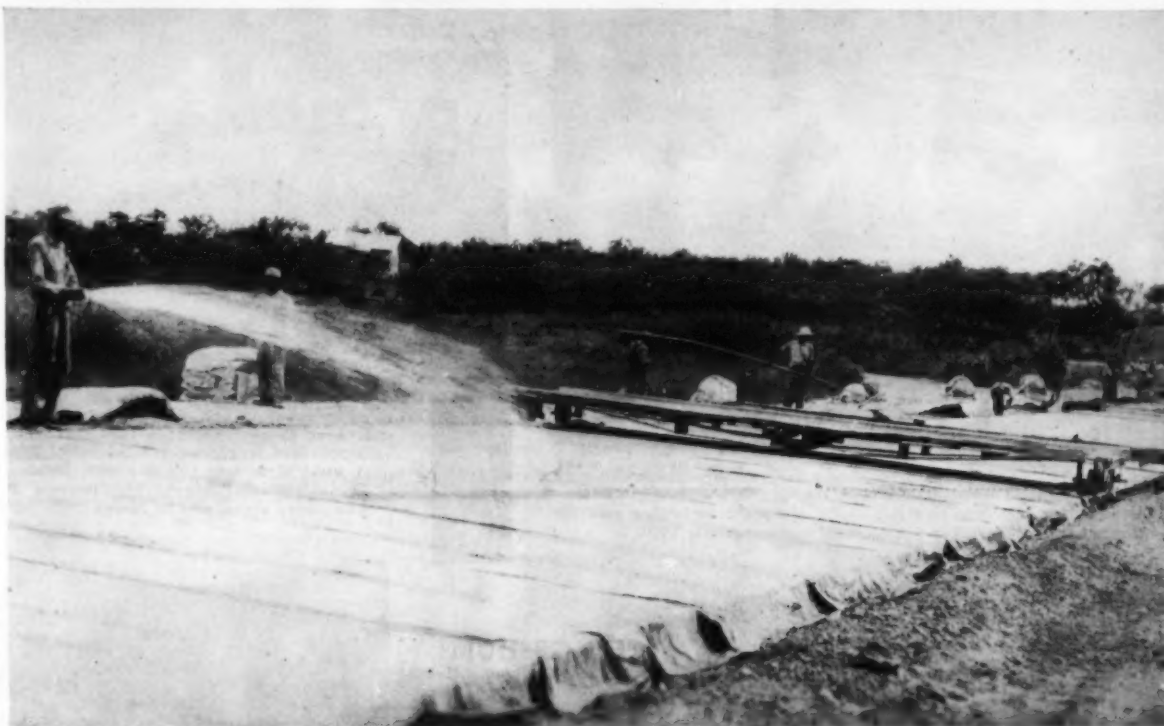
gasoline-engine tractors, LeTourneau Carryalls with Caterpillar diesel tractors, and Allis-Chalmers diesel tractors hauling both Carryalls and Gar Wood scrapers. Clay, sand, gravel and silt were the soils encountered and all the equipment performed well, considering the unfavorable weather encountered.

George & Lynch secured excellent production from four Euclids loaded

by an Austin-Western elevating grader on Contract Ce-215, working on a 3,000-foot haul from the borrow pit and moving 214,500 cubic yards in 46 working days.

C. J. Langenfelder & Son made the best production record on the project, moving 195,000 cubic yards of excavation in 18 working days on Ce-214. Two

(Concluded on page 49)



Courtesy Cotton Textile Institute.

Specify NATIONAL BRAND Cotton Quilts for curing and protecting fresh concrete

The result?—Higher strength concrete!

Contractors

have found that NATIONAL COTTON QUILTS are long-wearing. When used for concrete curing, they have withstood well over 50 applications and removals. They have a life four times that of ordinary burlap sheets when wetted and used for curing.

"Use More Cotton"—and you'll be building better concrete roads.

FROM actual tests made in field and laboratory by numerous State Highway Departments, COTTON QUILTS when used for concrete curing have been found to produce a higher compressive strength in the concrete than other curing agents.

The Portland Cement Assn. has found that the use of COTTON QUILTS insures a supply of moisture for curing and protects the pavement from temperature changes during the curing period, when concrete has little strength to resist temperature stresses.

The Federal Public Roads Administration has approved the use of COTTON QUILTS on Federal and Federal Aid concrete paving projects.

All highway engineers and contractors maintain that no curing agent excels the water method. . . Thoroughly wetted NATIONAL BRAND COTTON QUILTS are "TOPS" in simple, effective, economical concrete-curing. Try them—and see for yourself!

Distributors

are finding that NATIONAL COTTON QUILTS are fast-selling. They will be increasingly so in 1941, owing to extra activity in the road building industry due to national defense requirements, and to the hearty endorsement given COTTON QUILTS by Federal and State authorities.

Open territory now available. Distributors' inquiries invited.

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You are invited to make tests and comparisons. As a first step, why not write for illustrated leaflets, on the above?

Palmer Asbestos & Rubber Corporation

180 N. Michigan Avenue Chicago, Ill.



THEY GO TO IT! The excavation of 13,000,000 yards of overburden from the dam site was carried on, in 1935, by giant shovels loading to trucks and tractor-drawn crawler wagons which delivered it to a belt-conveyor system.



THE START. In January, 1934, work on Grand Coulee was just beginning with drilling to investigate the bed-rock on the proposed site. The trench in the upper central portion of this picture marks the west, or left, abutment of the dam.



BASE STARTED. About one-third of the base of the dam was built in the west cofferdam, aggregate being carried across the river by a belt conveyor on the 3,400-foot suspension bridge seen in the right center. This photo was taken September 24, 1936.



THINGS HUM!

Inside cofferdams, the excavation of earth and rock, building the steel concreting trestle, and placing of concrete went on simultaneously in July, 1937. A terraced arrangement facilitated the handling of forms and reduced the required number to a minimum.



NIGHT AND DAY was the theme song for this gigantic project where things hummed around the clock. This general view, northeasterly over the dam, on December 28, 1938, shows construction activities going full blast at night. The lights of Mason City, the contractor's camp, are seen in the upper left of the photo.

FROZEN UP! But intentionally so. To restrain a slide during excavation and concreting, a frozen earth dam 45 feet high, 25 feet thick and about 100 feet long, was created by driving 3-inch steel pipes into the clay and circulating brine through them at zero degrees F. The above scene was in March, 1937.



GRAND COULEE

This Great Structure in the State of Washington Has Many Records for Magnitude and Speed



MAN-MADE GIANT. Grand Coulee dam, the largest in the world, is the site of the balancing reservoir to be formed by the dam.

GATES, NOT PEARLS

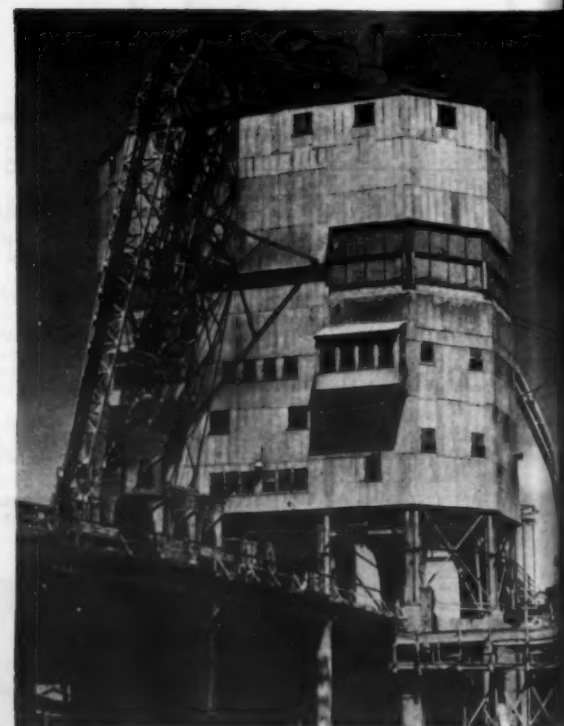
The 70-ton gates to close the version channels, one of which is shown at the right, were set in place against steel guides by a floating crane. The gates, each which was 52 feet wide, 25 feet high and weighed 70 tons, were provided with rollers and were slowly lowered along the guides to cut off the flow of water.



BURIAL. Most of the concreting trestle was buried in the concrete of the base of the dam. After it had been brought to an elevation above the usual high water mark, the cross-river cofferdams were removed and the river flowed through low gaps left in the spillway section. Above is shown the progress made by March, 1938.

WORLD'S RECORDS

in concrete mixing and placing, not soon to be passed, were made at Grand Coulee in 1939. On May 25, 1939, 20,884 yards of concrete was placed. In October of that year, Consolidated Builders placed 536,264 yards of concrete, at an average rate of 17,299 yards a day. At the right is the giant concrete mixing plant which made these records possible.



COULEE DAM

State of Washington Holds
and Speed in Construction.

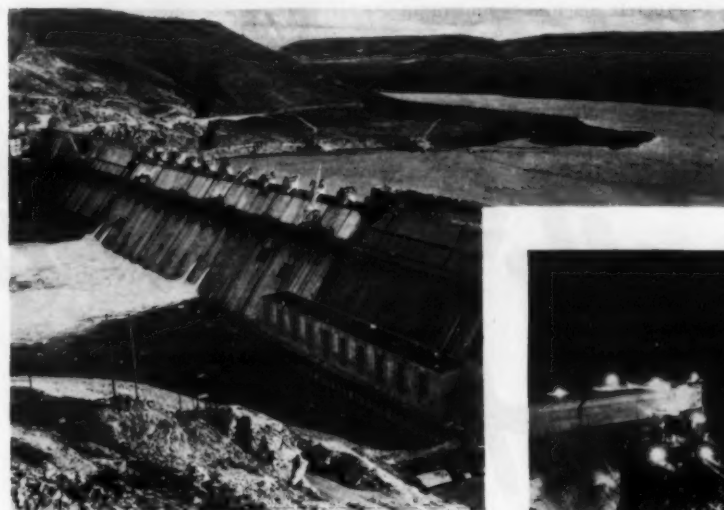
Photos



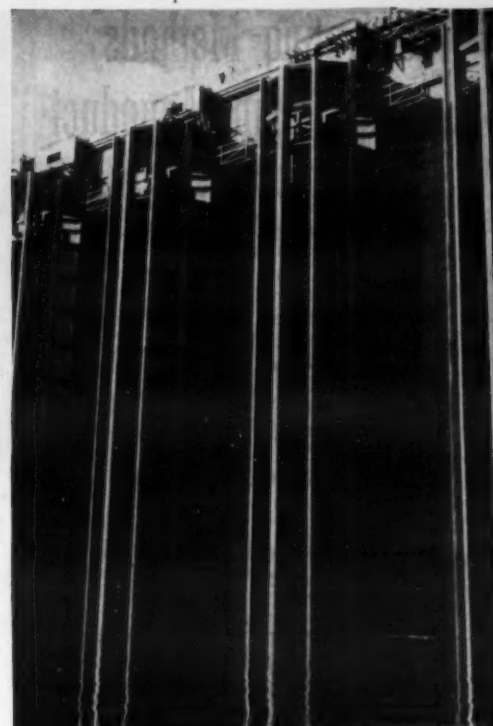
Grand Coulee Dam on the Columbia River, 600 miles from its mouth. View from the right abutment parking area on October 31, 1940, showing the dam and, in the upper center, the entrance to the spillway.



THE GIANT RISES. This is a general view of the right end of the dam from the right abutment parking area on October 31, 1940, showing the trash racks which will prevent the entrance of floating debris into the penstocks and outlet conduits.



NEARING THE TOP. A view of the dam on October 31, 1940. At the ends the dam has reached its full height, 550 feet above lowest bedrock. Reinforced arch bridges, supported by the piers between the gates, will carry a 30-foot road across the spillway.



TRASH RACKS. A close-up of the trash rack structures for the left group of main-unit penstocks. Each protects a 15-foot wide x 30-foot high entrance to an 18-foot diameter steel penstock.



NO BLACK-OUT HERE. Twenty-four hours still make a working day at Grand Coulee in October, 1940. Under the brilliant glare of powerful floodlights, work continues at top speed throughout the night. By January, 1941, 10,500,000 yards of concrete had been placed, using 43,000 carloads of cement and the equivalent of 380,000 carloads of sand and gravel.

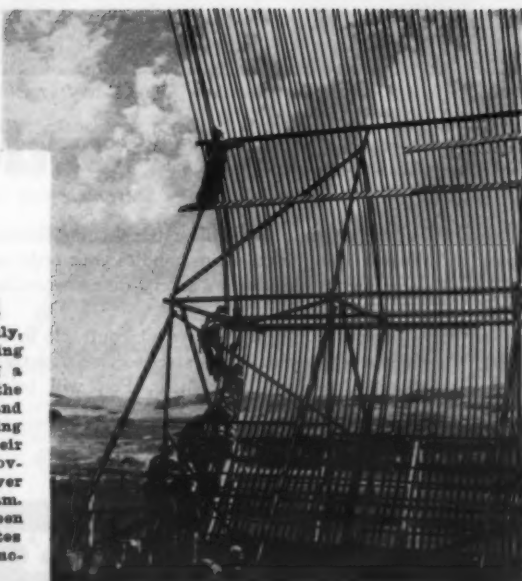
SILHOUETTE.

Man looks small indeed beside this giant upstream face of Grand Coulee Dam.



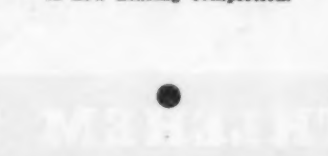
BEHIND BARS

Being assembled, in July, 1940, for steel reinforcing of the concrete walls of a drum gate chamber in the spillway section of Grand Coulee Dam. The floating drum gates, hinged at their upstream edges, will govern the flow of water over the spillway of the dam. Freezing of water between the gates and the pier plates will be prevented by induction heaters.



WINTER HOLDS SWAY

but in spite of the cold, 2,500 men are at work at Grand Coulee, which is now nearing completion.



Concreting Methods For Giant Aqueduct

(Continued from page 2)

pipe, respectively, to separate compartments of a 2-compartment batch box on a flat car. When a train of batch boxes reaches the Ransome dual-drum paver located at the point of concreting, an overhead monorail crane lifts the boxes and dumps them into the 1 1/3-cubic yard paver which delivers the concrete directly into the hopper of the Pumpcrete machine. The work advances away from the shaft, the batch trains running on track laid on the finished invert.

On a contract for 5.8 miles of 15-foot tunnel, the Seaboard Construction Corp. is also using the Pumpcrete method of placing concrete, which was used successfully in the construction of some 91 miles of tunnel for the Colorado River Aqueduct Project in Southern California. Two tunnel-lining machines were built to meet the specific problems faced on this section of the work, each unit consisting of a No. 200 double Pumpcrete, a 2 1/2-cubic yard rotary mixer and a 24-inch wide belt conveyor, all of which are mounted on a traveling bridge running on a broad-gage track straddling the invert. Each Pumpcrete unit is capable of placing concrete in the tunnel lining at the rate of 65 cubic yards an hour.

Another problem on this contract was delivering the concrete to the tunnel-lining machine. This was solved by the use of a number of 5-cubic yard Blaw-Knox electrically-operated agitators mounted on industrial-railway trucks and hauled by Goodman electric locomotives in trains of two cars from the loading point within the tunnel to the actual placing operations. The concrete is mixed at the surface and dropped through a 10-inch pipe into a loading hopper which in turn feeds the concrete agitator cars.

After building the curb walls by chuting the concrete into the forms from agitator cars on the original muck track, the track is taken up, the bottom mucked and cleaned, and the invert poured. Agitator cars, running on the traveling bridge above the invert, chute the concrete into place ahead of the Blaw-Knox invert screed. After the invert has been poured, set and cured, working away from the shaft, narrow-gage track for the agitator cars is laid on it, as well as broad-gage track to carry the steel arch and side-wall forms. The arch and side-wall lining is poured in one operation and progresses toward the shaft. The Pumpcrete and other machinery are mounted on a second traveling bridge at the shaft end of the arch and side-wall forms. From the narrow-gage track on the invert, the trains of loaded agitator cars run up onto the Pumpcrete bridge over a ramp 86 feet long. From the agitator cars the concrete is discharged directly onto a 24-inch Rex belt conveyor which carries it to the Pumpcrete mixer which feeds it directly to the pumps. The concrete is then pumped



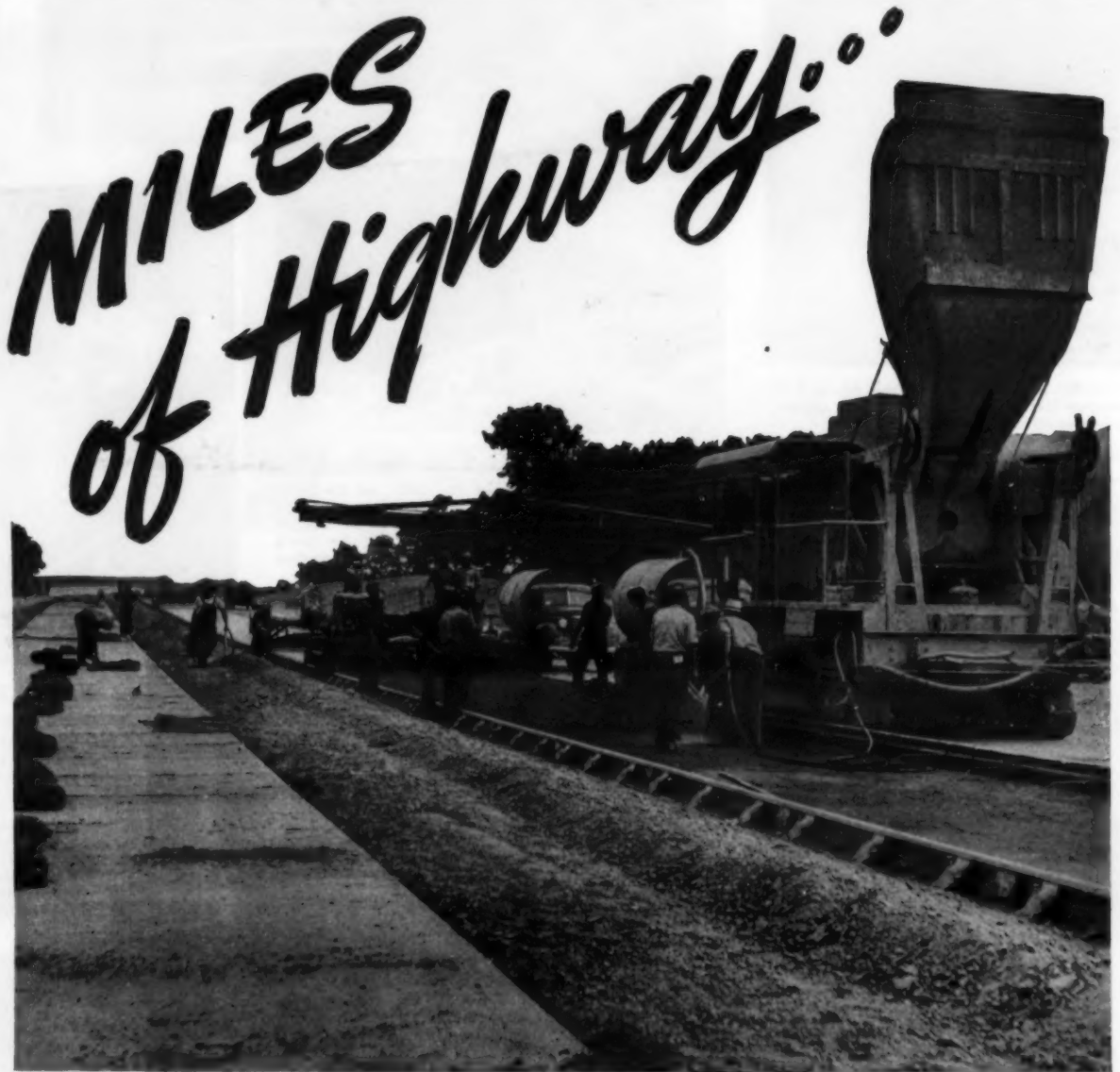
The Ransome dual-drum paver with boom removed and the Rex Pumpcrete used by B. Perini & Sons on its contract for lining 30-foot diversion tunnel at Merriman Dam.

over the top of the arch forms. As the work progresses the traveling bridge with its Pumpcrete machinery and ramp

moves ahead of the forms toward the shaft. Generally 100 to 160 feet of side wall and arch are concreted at one time.

On Contract 307, including the excavation and lining of 5.0 miles of 19.5-foot tunnel, for which the S. A. Healy Co., White Plains, N. Y., is contractor, the concreting methods are somewhat different, although this contractor is also using a Pumpcrete. On this job the concrete traveler rails are supported on piers built of concrete in bags instead of on curb walls, and the invert is poured under a form instead of being screeded. The 130-foot invert form travels as a unit on the rails and is jacked down by struts against the tunnel walls before concreting. From the batching plant at the shaft head, the aggregate and cement are dropped separately through 10 and 6-inch pipes to hoppers in the tunnel, loaded into separate compartments in the batch cars, modified 4-yard muck cars, which transport the batch on narrow-gage track laid on the finished invert to the mixer. This 34-E Rex dual-drum paver, with the skip replaced by a fork which lifts and dumps the batch cars, is mounted on narrow-gage rail-

(Continued on page 44)



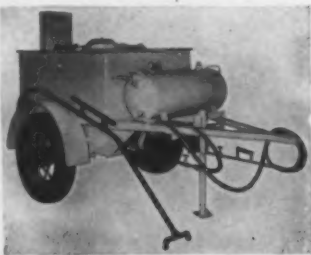
on a single Bethlehem order

WHETHER you're building twenty miles of state highway or a single city block, you'll find it practical and profitable to concentrate the purchase of all the steel required for the job with Bethlehem. A single order will bring everything you need as you need it: bar mats, welded wire fabric, road joints, reinforcing bars, dowels, bar ties, highway guard, piling.

In this way you not only eliminate delays due to slow deliveries. You cut down on non-essential detail work. You

waste no time in needless telephoning, correspondence and bookkeeping. Bethlehem handles your order as a unit, plans shipments and meets delivery dates according to your own requirements.

Before you start your next contract, investigate Bethlehem's single order road steel service. A letter to Bethlehem Steel Company, Bethlehem, Pa., will bring detailed information.



ASPHALT KETTLES
Fire Proof—Oil Burning

Hand and Motor driven spray.
Many sizes. Write for catalog.

White Mfg. Co.
ELKHART INDIANA

BETHLEHEM STEEL COMPANY



Picnic Debris and Asphalt Don't Mix

At one of the several portable asphalt plants which we visited during the past summer, the stockpile of sand was used by many members of a local gun and fish club for sun bathing on week-ends. The 20,000-ton pile of sand, 12 feet high, provided all of the features of a sand dune, so dear to the hearts of those delighting in salt water bathing. The only distinction in this case was that the stockpile was adjacent to a large pool of fresh water from which the sand had been dredged and washed preparatory for use in a portable hot-mix asphalt plant.

Inasmuch as the material had been screened once, it was really not necessary to use the screen in the portable asphalt plant, but the local members of the gun and fish club littered up the sand pile with beer cans, stones, which they diligently lugged in to make designs and structures in the sand, rags and other miscellanea of picnickers so that the screen of the asphalt plant was used to remove litter and rubbish which would in no way improve the mix.

New Ransome Dealers

The Ransome Concrete Machinery Co., Dunellen, N. J., has announced the appointment of T. G. Abrams, Dearborn,

Mich., and the Anderson Equipment Co., Grand Rapids, as new agents. They will handle the sale of Ransome pavers, mixers, truck mixers, agitators and other Ransome products, with the exception of 7-S mixers and smaller, in their respective territories. The Michigan Equipment Co., Detroit, will handle 7-S and smaller mixers only.

Booklet on Slide Rules

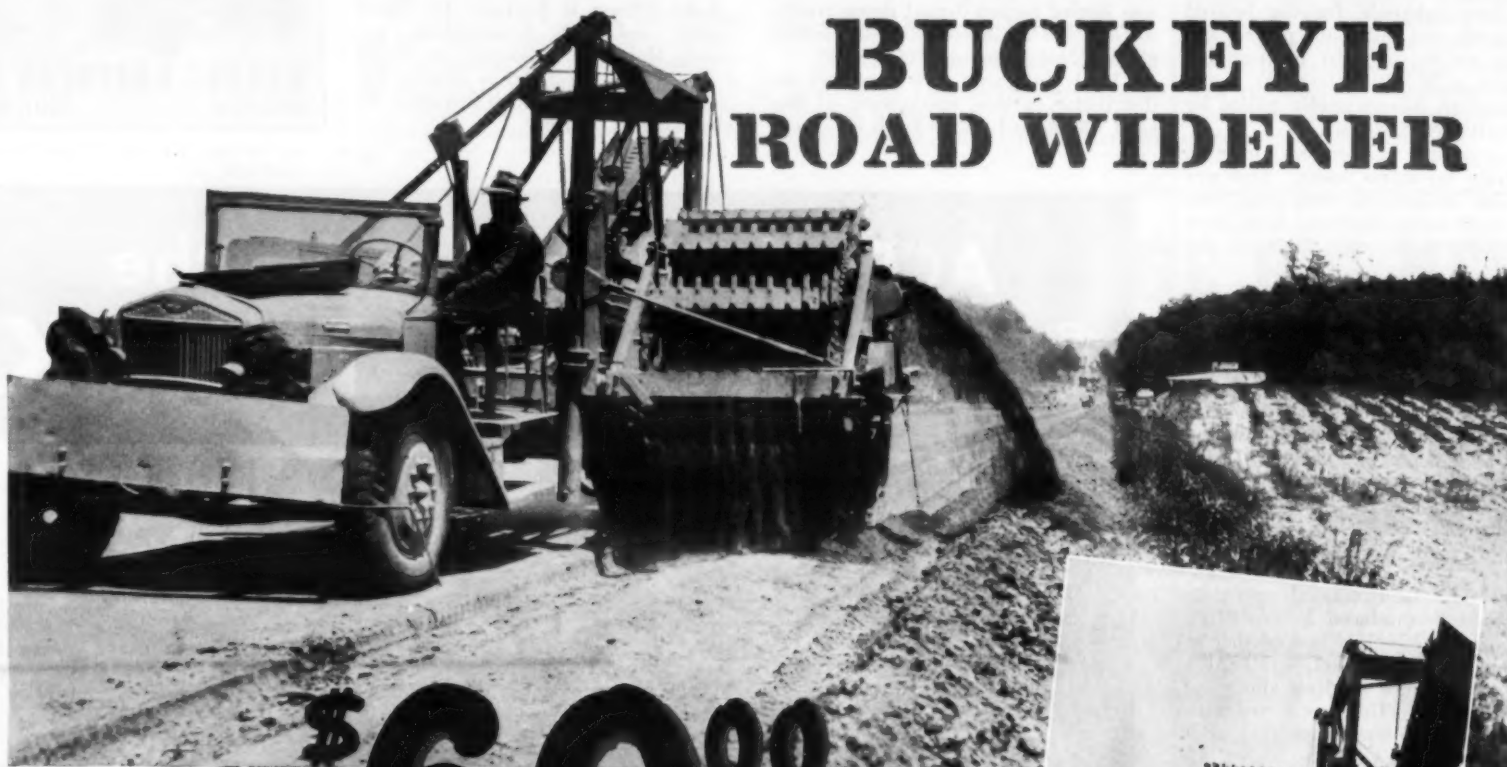
Keuffel & Esser Co., Hoboken, N. J., has recently published a humorous booklet entitled, "How To Choose A Slide Rule," by Don Herold, which explains the difference between the various types of slide rules available. Copies may be

obtained without charge direct from the manufacturer.

Diamond Iron Makes Personnel Changes

The Diamond Iron Works, Inc., Minneapolis, Minn., announced recently the appointment of William E. Wright as Sales Engineer for the company. Mr. Wright was formerly associated with the Austin-Western Co. and for the past three years has conducted an equipment business in Wisconsin.

Frank P. Blancett, district representative for this company, has been transferred from the Southwest territory to the East Central territory.



Saves \$60⁰⁰ per day

ON SOUTH CAROLINA JOB!

CONTRACT: Four foot widening on one side of Highway 117 in South Carolina between Calypso and Dudley.

CONTRACTOR: Wm. F. Bowe, Jr., Augusta, Georgia.

METHOD OF WIDENING: Subgrade trench dug with a BUCKEYE Model 16-R-4 Highway Widening Machine. Concrete poured between existing slab and 8" steel forms.

DIMENSIONS OF WIDENING TRENCH: 4'-9" from edge of existing slab, to allow 4' widening and 9" for setting forms. 8 inches deep.

SPEED OF TRENCHING: Widening trench cut to specifications at the rate of a mile per day!

DOLLAR SAVING: \$60.00 per day saved over previous method of trenching due to speed and accuracy of Buckeye machine!

SAVING ON CONCRETE: Excess of aggregate on 3 miles of work done prior to use of Buckeye Road Widener was 8%. Ability of machine to cut to accurate depth reduced this to 2%!

OTHER ADVANTAGES: Machine served as "spark plug" or pace setter for entire job.

Go out and look for road widening jobs this year. You can bid low and make a good profit if you base your figures on using a Buckeye Road Widener for the job! Write to Buckeye today and ask for complete information and a bulletin on these money-making machines.

BUCKEYE TRACTION DITCHER CO., Findlay, O.

Built by Buckeye

Convertible Shovels



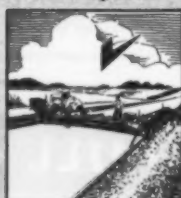
Trenchers



Tractor Equipment



R-8 Finegraders



Road Wideners



Spreaders



See other cost-cutting Buckeye Equipment on Page 5

Surface Treatment Improves County Road

(Continued from page 12)

grouted as described.

Crushed granite, with a maximum size of 3 inches, was hauled from the County's quarry at a small hill in the suburbs of Yuma and spread 6 feet wide and 6 inches deep in the shoulder excavations. It was wet down with a 750-gallon Chevrolet tank truck and compacted to an inch or more below the surface of the old pavement by a 12-ton Austin roller.

Work on the Curve

The new subgrade for the banked curve on the east end of the project was built up by moving dirt in from the sides with a No. 10 Caterpillar motor patrol and an Adams grader pulled by a Caterpillar Fifty tractor.

At one point it was necessary to lay a cross drain for storm water. This was done with 20-inch concrete pipe, and rubble head walls, cemented with grout poured over them, were built on the ends.

A 6-inch course of rock 27 feet wide was spread on the new roadway, and a light layer of fine material bladed across from the sides as a filler, while the tank truck watered the grade. Crushed stone under 1 1/4-inch in size was hauled from the quarry and spread over the surface to a depth of 2 inches. Traffic was admitted on the curve while sprinkling and compaction by the 12-ton roller was going on.

Surface Treatment

A few days later mineral aggregate under 5/8-inch, produced by installing temporarily a secondary jaw crusher at the County crushing plant, was hauled in and dumped in a windrow along one side of the road. This was mixed with SC-4 road oil, in the proportion of 9 gallons per cubic yard, by a No. 12 Gardner mobile mixer. The oil was hauled from tank cars at Yuma in an 800 and a 1,300-gallon tank truck, and was distributed to the windrow in one pass, being pumped through a hose line directly from the tank to the mixer box as the two units moved along.

The mix was completed in two passes with a couple of No. 10 motor graders, which laid down the mix on one half of the road at a time, leaving the other side open for traffic, except at the new curve where traffic was detoured over the old roadway. The new oil surface is 3 inches thick on all the new construction, including 3 feet at each edge of the old pavement, and is 2 inches thick over the old surface. The remaining 3 feet of rock on the shoulders was left to hold them flush with the pavement. The surface was then compacted several times with an 8-ton Erie tandem roller in addition to compaction by regular traffic.

An interesting phase of the job was the method of applying the final seal coat. One-half gallon of SC-4 oil per square yard was distributed by a tank-truck unit pulled behind a Reo county truck. Three passes were necessary, and part of the road was always open to



A truck, moving backward, spreads a thin layer of sand on the seal coat.

traffic. Sand passing a 1/2-inch screen was hauled in two 3-yard dump trucks, a Ford and a Chevrolet, from another gravel plant 16 miles distant.

Closely following each pass with the distributor, a thin application of this sand was spread on the fresh oil direct-

ly from the truck beds. The truck body was tipped just enough so that all the sand would run out, the end gate was raised slightly by a man who ran along beside the truck while it moved backward, and who directed the driver when to stop.

As soon as one side of the road was sanded, traffic was directed over it to speed compaction. When sanding was completed, a special brush made of two sections of a street sweeper broom bolted into a frame 5 feet wide was hooked behind one of the Caterpillar graders and used to even the sand ahead of the Littleford Wheeled roller which compacted the seal coat. This roller was borrowed from the State Highway Department for use on this job.

Personnel

Luke Ellison is Engineer for Yuma County and Earl Cunningham was County Maintenance Foreman in charge of this work. Al Slater is District Engineer for the WPA which furnished the labor for this project.

GET THIS NEW ARC WELDING BOOK FREE

This valuable book tells you all about "Simplified" Arc Welding and the hundreds of ways it will pay you on your work. Tells about hundreds of jobs all around you that may be had for the asking. Book contains over 100 illustrations. Write for it today, no obligation.



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Try a new Hobart Welder on your own work at our risk to prove it's profitable. Write for complete details.

HOBERT BROTHERS CO.
BOX CE-31 TROY, OHIO

ACE of All Trades . . . the CHEVROLET TRUCK



Inspect these NEW 1941 FEATURES

★ TWO NEW VALVE-IN-HEAD ENGINES . . . STANDARD: 174 FOOT-POUNDS OF TORQUE—90 HORSEPOWER . . . "LOAD-MASTER": 192 FOOT-POUNDS OF TORQUE—93 HORSEPOWER ★ NEW RECIRCULATING BALL-BEARING STEERING GEAR ★ NEW, MORE COMFORTABLE DRIVER'S COMPARTMENT.

*Optional on Heavy Duty models at extra cost

60 MODELS

ON NINE LONGER WHEELBASES . . . A COMPLETE LINE FOR ALL LINES OF BUSINESS

For every trade or industry or business that uses motor trucks, ranging from fleet delivery units up to Heavy Duty models of 14,000 pounds gross-weight rating, there is a 1941 Chevrolet truck designed to fulfill your requirements.

For 1941, Chevrolet—the world's leading builder of motor trucks—presents the most complete and most capable line of trucks in Chevrolet's history. Now, from Chevrolet's expanded line, you may have your choice of sixty models on nine longer wheelbases. Now you may enjoy the benefits of Chevrolet's famous economy and long life in new models that incorporate important improvements in chassis and body, and the most powerful truck engines in the low-price field—the 90-horsepower Standard engine with 174 foot-pounds torque, and the 93-horsepower "Load-Master" engine with 192 foot-pounds torque, optional at small extra cost on Heavy Duty models.

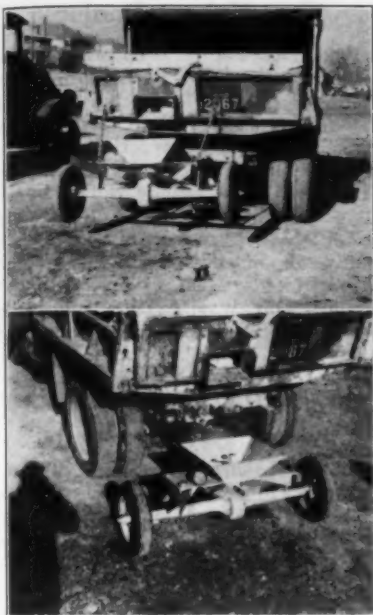
CHEVROLET MOTOR DIVISION, General Motors Sales Corporation
DETROIT, MICHIGAN

Contractors—Prevent loss of tools and other equipment with this EVERHOT Branding Iron

This inexpensive Branding Iron may also be used as a soldering iron or blow torch.

EVERHOT MFG. CO.
51 S. 19th St.
MAYWOOD, ILLINOIS

OUT-PULL . . . OUT-VALUE . . . OUT-SELL



Another type of spreader used in ice-control operations by the Maryland State Roads Commission. Above, the spreader in carrying position; below, in working position and showing the agitator in the bottom of the hopper.

Fighting Ice Hazard On Maryland Roads

(Continued from page 20)

let and side ditches are cleaned and faulty drainage structures replaced. In general, the policy adhered to is to remove or correct any causes which may contribute to the formation of ice on the highways.

Meeting Ice Hazard

When ice conditions develop, crews of men and equipment are assembled as quickly as possible in order to spread treated abrasives over surfaces where experience indicates trouble may be expected. Steep grades, curves, intersections, railroad grade crossings, and locations where quick braking may be required receive first attention. At the same time the traveling public is advised of road conditions through broadcasting, news and travel agencies.

Warning signs reading "Icy Roads Ahead" are placed sufficiently far in ad-

vance of extremely dangerous locations. This prepares the motorist for road conditions ahead and allows him to approach the danger spot with his car under control. Weather bureau forecasts are very helpful in that to be forewarned is to be forearmed.

Stockpiles of abrasives, such as cinders, coarse sand and other granulated material, treated with 30 to 50 pounds of calcium chloride per ton, are placed in piles ranging from 40 to 50 tons at points where experience indicates they will be most needed. These abrasives cost this Commission very little outside of the actual hauling due to the fact that every available local source of free supply is thoroughly exhausted before any thought is given to the purchase of abrasives. Reports indicate that treated cinders give the best results.

All stockpiles are placed and treated not later than November 15. Although this Commission does not at present protect its piles of abrasives with any form of covering or use storage bins, it is considering the economical value of doing so.

Abrasive material is spread at the rate of approximately 5 pounds per square yard by means of spinning discs attached or pulled behind trucks. On dual highways or heavily traveled roads the entire width of the road is covered, while on the lighter traveled ones, only the center section is treated.

In addition to standard lights, all trucks used in ice-control work are equipped with swivel spot-lights located on the top of the cab. This serves as a warning to the traveling public and provides the light for the men at work.

Clean sodium chloride has been used effectively where there is a considerable thickness of ice in shady spots.

During sleet storms trucks loaded with treated abrasives patrol the roads ready to render all possible aid to troubled motorists.

No opportunity is lost to clear the pavement surface of ice. At the first indication of a thaw, all men and equipment are concentrated in removing as much slush from the road as possible before it freezes again. Grader blades are very useful in this type of work.

Cooperation Big Help

State Police and attendants at all-night stands and bus terminals are very cooperative in notifying the nearest highway garage of any change in driving conditions which may suddenly develop

during the night. An employee at this garage immediately reports to his superior and at the same time calls out sufficient equipment and crews to take care of the situation.

While highway employees may lessen the hazards of winter driving, their work will avail but little if the traveling public does not cooperate by properly equipping their vehicles before setting out and use every precaution once they are on their way. Skid chains should not only be carried but used, as a car or truck skidding across the roadway as a result of not being properly equipped or from any other cause, not only endangers lives, causes unnecessary delays to themselves and others, but seriously handicaps our ice-control program.

Weather Affects Paving More Than Heavy Loads

Bertram H. Lindman of the National Highway Users staff has prepared a bulletin entitled "Effects of Weather and

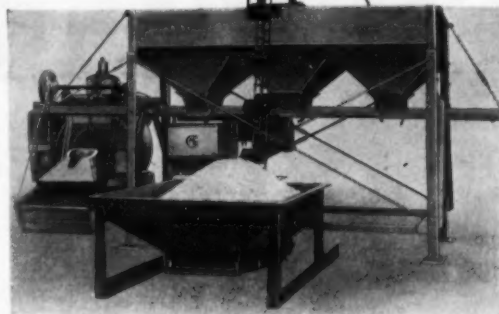
Heavy Loads on Pavements" which "presents a discussion, supported by outstanding authorities, showing how experience lights the way to modern road and vehicle design, and to official size and weight recommendations that would permit motor transport to best serve the nation." Tables are included giving vehicle size and weight recommendations and Army standards; size and weight limitations of each state; gross weights allowed by states having formulae based on distance between the first and last axles; and standards for highways of military importance.

In the Foreword, Chester H. Gray, Director, National Highway Users Conference, states: "The thesis that vehicles of heavy gross load are not destructive to pavements—if those loads are adequately and properly distributed—is supported by corroborating evidence. These marshalled facts show that most pavement damage results from non-uniform subgrade support and weather conditions—freezing, thawing and quick changes of temperature."

CMC THE BIG NEW EQUIPMENT LINE FOR 1941

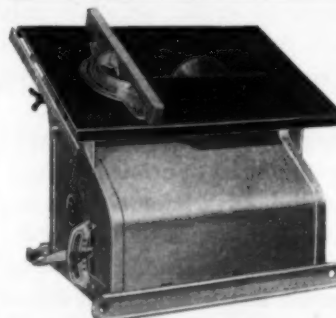
Loads, weighs, charges mixer. An unbeatable concrete producing set-up. Saves men—speeds up work.

CMC BIN BATCHER
WILL HANDLE CONCRETE AGGREGATES AT BIG SAVINGS OVER OTHER METHODS.



Now available with bucket elevator and receiving hopper. This efficient auxiliary bucket elevator with receiving hopper at 5 cu. yard capacity to take truck deliveries of aggregates makes the Bin-Batcher more versatile than ever. Hopper has reciprocating feeder—operates at ground level. The ideal combination is this CMC Bin Batcher and a modern CMC 10S or 14S Mixer.

CMC DUAL PRIME PUMPS. A Complete line from 1½" to 10" Unmatched in priming speed with exclusive "Dual Prime" feature. Doubly fast—Doubly sure. Unbeatable in pump service and stamina. Illustration shows CMC Dual Prime 40 M pumping 40,000 G. P. H. on bridge job. Here's a standout pump for all around service.



CMC KOST KUTTER POWER SAWS. New streamlined speed saws that take workshop advantages right to the job. All steel welded frame construction. Power unit protected against saw dust. Three sizes Kost Kutter Sr.—14" blade. Kost Kutter Jr.—10" blade. Big "Power Sawyer"—16" blade. (18" and 20" blades optional).

GET THE NEW CMC CATALOG

Bigger than ever. See the Enlarged choice of Models, all sizes up to 28S.

Hoe Type Mixers—The broadest line in the Field. Batching and Placing Equipment.

Hoists—More than 40 Popular Models—8 to 40 H.P.

CMC Line. Concrete Mixers—Widest

Pumps—Complete line of Efficient Modern Dual Primers.

Power Saws—3 Popular Sizes.

Costs and Barrows—The preferred Line Everywhere.

Write Today

CONSTRUCTION MACHINERY COMPANY
WATERLOO, IOWA



KILLEFER revolving RIPPERS

Do a better job of ripping with a Killefer Revolving Ripper. It works 14 inches deep, which is best for breaking up material... best for tools that follow... and best for capacity loading of scrapers. It's a self-cleaning ripper. At a pull of the control the standards revolve and step over obstruction without stopping or backing. 3 SIZES—require tractors of 35 to 95 H. P. Keep your earth-moving equipment busy and your wheel scrapers full with a Killefer Revolving Ripper.

KILLEFER MFG. CORP., LOS ANGELES, CALIFORNIA • BRANCH: PEORIA, ILLINOIS

SOLD BY "CATERPILLAR" DEALERS EVERYWHERE

Pneumatic Tool Catalog

The Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill., announces that eight new pneumatic tools are featured in the Thor No. 52 catalog, 1941 edition. These new Thor tools are right-angle and close-corner drills, right-angle nut setters and screw drivers, bolt wrenches, grinders, chipping hammers, sanders and saws. Fully illustrated by tool and action pictures, this catalog also gives complete specifications on the entire line of Thor pneumatic tools and accessories, including rotary and piston

air drills, close-corner drills, rotary brushes, core and rivet busters, motor hoists, and others.

Those interested may obtain copies of this catalog from the manufacturer.

Pressure-Treated Culverts

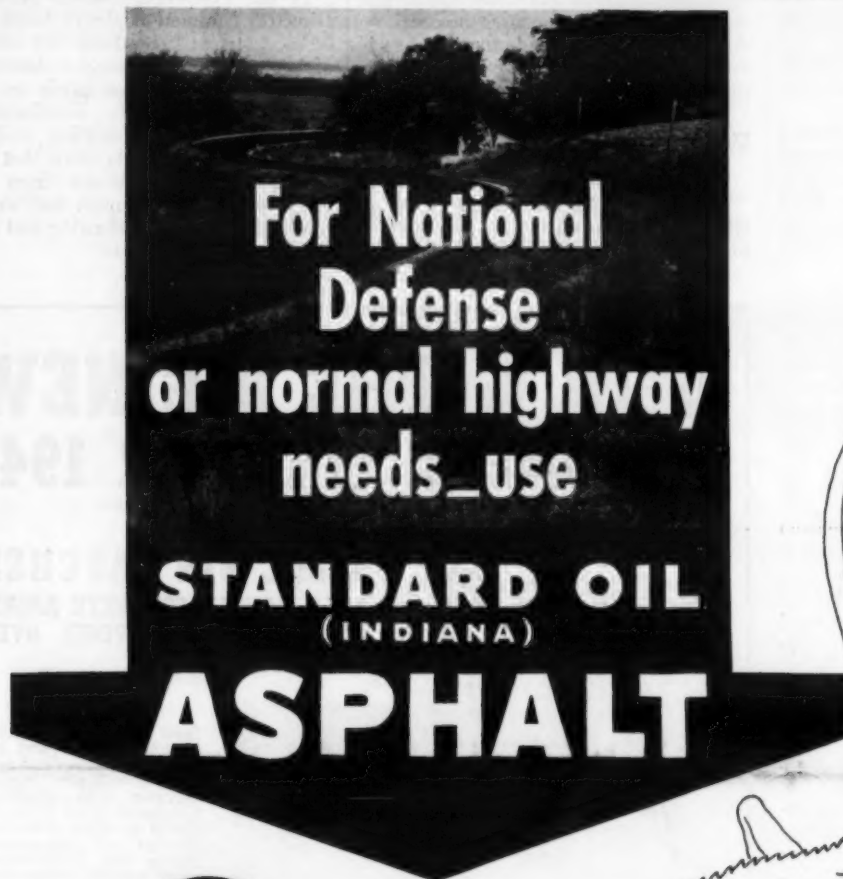
Prefabricated culverts which, according to the manufacturer, can be erected by unskilled labor and can withstand loads in excess of 20,000 pounds are described in a booklet, Form G-16, recently published by Koppers Co., Wood Preserving Div., Pittsburgh, Penna. These

culverts are made of laminated pressure-treated wood, with sections interlocking cornerwise and lengthwise to form a solid, unified construction. Drawings and photos show how they are assembled, a table lists sizes obtainable, details of the lumber and the preservative treatment used are given and there is information on their advantages and use for railroads, highways, airport drainage, conduit for pipe lines and waste and storm sewers.

Copies of this booklet "Pressure-Treated Laminex Culverts" may be obtained direct from the manufacturer.

New Hobart Dealers

Announcement has been made by the Hobart Brothers Co., Troy, Ohio, manufacturer of arc welding equipment, of the appointment of H. F. Schotters to supervise distribution of Hobart equipment in northern Indiana and western Michigan, with headquarters at the Koontz-Wagner Electric Co., South Bend, Ind. New Hobart distributors recently appointed are C. H. Antrim, Grand Rapids, Mich.; Hoosier Oxygen Service, Fort Wayne, Ind.; and Bing-rods, Inc., Kalamazoo, Mich.



1 It's adaptable

to every highway paving problem

● Here is an advantage of Asphalt for highway improvement that you should not overlook, whether you are considering defense plans or your regular highway program.

There is a type of construction with Asphalt that exactly suits every paving need. Surfacing unimproved roadways, resurfacing worn existing pavements or widening inadequate roads can be accomplished with the minimum of time and expense by choosing the type of Asphalt construction best suited to each job.

In each type of construction full consideration is

given to utilizing existing aggregates or surfacing. That's a big saving to start with. A roadway can be brought to any stage of improvement that the traffic requires. And this road can be further improved from year to year as traffic demands increase without sacrificing the materials already on it.

A Standard Oil Asphalt representative will gladly discuss these and other advantages of Asphalt construction as they might apply to your particular problems and local conditions. Just write Standard Oil (Indiana), 910 South Michigan Avenue, Chicago, for the representative nearest you.

here are **3** reasons
for using Asphalt

1 It's adaptable

—to every highway paving problem; new construction, resurfacing, widening, or stabilization.

2 It's economical

—because it's easy to lay, with simple equipment, and gives full salvage of existing roadway material.

3 It's time-saving

—because local aggregates, labor, and equipment are readily available.

*Asphalt for
every purpose*

STANDARD OIL COMPANY

(INDIANA)



The new dual-drive sand spreader.

Truck-Driven Unit Sands Icy Highways

A dual-drive sand spreader for use on icy highways and streets, which can be used with or without the engine, has been announced by Ace Equipment Co., Oshkosh, Wis. The spreader will handle all types of materials used for ice control, and, according to the manufacturer, will run at all speeds and under all operating conditions at low cost and with complete safety.

The illustration shows the unit attached to a truck, and it is operated by a man standing on the platform where he is close to the ground, or standing on the truck box. The unit may be backed up slippery hills or run forward at any truck speed. The area of spread is dependent on the rate of truck travel when the unit is used with the truck motor.

This dual unit has safety lights, a sand suppressor which permits the operator to protect oncoming traffic, a mercury automatic clutch which stops the power flow when the unit is choked by rocks or sticks or when the engine is turned off, and a dual drive that requires less than 5 minutes to change from one drive to the other. Other features are standard tire width, adjustable deflectors, a self-feeding hopper, an inverted cone-type agitator, and standard parts used throughout the assembled unit. It is made of boiler-steel plate, electro-welded, weighs 550 pounds, and is driven by an air-cooled engine equipped with a footstarter and throttle control mounted at the top of the safety rail. The engine engages at 800 rpm as a precaution against gear breakage.

Newly Styled Trucks Announced for 1941

Lighter weight and greater accessibility are announced as features of the 1941 line of newly styled trucks made by the Four Wheel Drive Auto Co., Clintonville, Wis. Of special interest is the provision made for the use of optional engines which in the lighter H series allows for engines from 85 to 113 hp. Two series of axles are also available, to take gross loads up to 20,000 pounds. The transfer case is arranged so that a power take-off can be installed that will utilize all the speeds of the transmission and the full torque of the motor for earth-boring machines and similar services.

The fender arrangement of the new FWD's accommodates all types of snow plows and front-end equipment without alterations to the skirting and fenders. Another feature allows for either a high

or low mounting of the engine transmission and transfer case, depending upon the height of the body mount. Where center scraper plow and underbody graders are used, a 23-inch clearance under the center of the truck is provided.

Full details of the improvements in FWD's 1941 line may be secured direct from the manufacturer by mentioning this item.

1941 Improvements In Paving Machines

Announcement has been received of a number of specific improvements in Flex-Plane concrete-paving equipment for 1941. According to Flexible Road Joint Machine Co., Warren, Ohio, the Flex-Plane joint-installing machines will hereafter have two cutters instead of one for all types of contraction-joint installation. The first will cut the groove and the second will reopen it. The ribbon joint material has also been improved, being more pliable than heretofore.

The line of Flex-Plane finishing machines has had the 20-inch wide sectional screed improved so that the front section can be set from 0 to 1/4-inch higher than the rear adjoining section. In the case of dry material, the exact amount of concrete required is cut off by the first section and then reduced and finished by the second section without over-run. Another improvement in Flex-Plane

screeds is the crown adjustment near the ends. No shims are required as it is now accomplished with additional adjusting bolts.

The tapered screed wings are to be standard on 1941 machines. With their use the pile of concrete along the forms is always tapered in cross section, instead of being maintained with a vertical face, so that concrete will not fall over the forms.

85 to 200 HP ENGINES and POWER UNITS 55 to 115 KW GENERATING SETS—AC & DC

Write for full information
MURPHY-DIESEL CO., Milwaukee, Wis.



New Koehring Trail-Dump Has More Capacity

Another size . . . 12 cubic yards . . . has been added to the popular group of Trail-Dump units. This new unit has all the improved operating advantages of other proven models. High travel speed, short turning radius, easy maneuverability, instantaneous dump, ample power per gross ton and flotation . . . all combined . . . produce more yardage in the fill. Speed and economy, steady operation, flexibility of application and safety traveling are Koehring advantages . . . tested, proven and profitable for you. Know these advantages and many others . . . learn how they make money for you . . . see the Trail-Dump on the job.

KOEHRING COMPANY, Milwaukee, Wis.

● Koehring 12-yard Trail-Dump hauled by Koehring pneumatic tired tractor, with "non-raring" hitch, powered by General Motors 2-cycle Diesel . . . or gasoline engine . . . body interchangeable with Wheeler body for two tools with one tractor.

1869 Penco
CORRUGATED METAL CULVERTS

Easily installed—no delay and no maintenance. Guaranteed to meet U. S. and State Highway Specifications.

Durable . . . Permanent Low Cost

One-half or entire surface bituminous coated as specified.

Phone or write
PENN METAL CORPORATION OF PENNA.
48 Oregon Avenue, Philadelphia, Pa.

HEAVY-DUTY CONSTRUCTION EQUIPMENT





The new Model LP LeTourneau Carryall scraper.

New Scraper Model Has Many Features

A new single-bucket cable-controlled Carryall scraper, Model LP, replacing the Model P, for use behind D8 tractors and having a struck capacity of 12.1 cubic yards, has been announced by R. G. LeTourneau, Inc., Peoria, Ill. Among the new features of the Model LP is the dead-ending of the apron cable for longer cable life; a new apron design for increasing the capacity and reducing overflow and at the same time facilitating loading by reducing friction; and a new overhead traveling sheave assembly which keeps dirt out of the sheaves and lengthens the cable life. In addition this new model has positive ejection and regulated spread, controlled cutting, an 8-foot 6-inch cutting edge, the tailgate cable pull is at the load center, and the entire unit is built of box beam arc-welded construction for greater strength and light weight.

In order to operate the LP Carryall under all types of conditions, provision has been made to equip it with either four 13.50 x 20 tires or two 18.00 x 24's in the rear end, and in the front, either two 13.50 x 20's or two 18.00 x 24's.

Special Dump Bodies For Maintenance Jobs

One of the features of the St. Paul all-purpose maintenance dump body and hoist is the drop-away hinged sides which not only provide ease of hand loading and unloading of material for patching, shoulder repairing and hand sanding, but also give the workmen the protection of working from the safe side of the truck, out of danger from passing traffic. Another advantage of the drop-away side is that with the sides and

double-acting tail-gate lowered, the dump body is transformed into a standard platform body for the transportation of materials or equipment.

This Type DS body is furnished in 1½ and 2-cubic yard capacities, with body lengths of 7, 8, 9 and 10 feet, and a standard inside body width of 6 feet 6 inches. With the 7 and 8-foot bodies and a Model 46 hoist, a mounting height

of 10 5/16 inches can be furnished, although the standard mounting height is 12 5/16 inches; with 9 and 10-foot bodies, the standard hoist Model 53 has a mounting height of 13 inches, although lower heights are available.

This and other St. Paul hydraulic dump units are described in a catalog which interested state, county and town engineers and contractors may secure direct from the St. Paul Hydraulic Hoist Co., 2207 University Ave. S.E., Minneapolis, Minn., by mentioning **CONTRACTORS AND ENGINEERS MONTHLY**.

A Dragline Bucket, Strong and Light

A light-weight dragline bucket which, because of less dead weight, reduces wear and tear on other equipment and which is of all-welded construction, perforated on the sides with round holes to reduce the weight, is being produced by De Soto Foundry, Inc., Mansfield, La., in three types and seventeen sizes from

¾ to 4-cubic yards capacity. Larger sizes up to 20 cubic yards are available as specials.

Type LS is designed specially for levee and drainage work; Type TS is for handling gravel and hard clay, or any other material where a medium-weight bucket works to advantage; and Type HS is a heavy-duty bucket made especially for moving shale or any other hard formation where weight is essential to economical loading. The bucket is smooth on the inside and the bottom is not perforated. A one-piece hitch plate and trunnion distributes the strain of the pull and hoist over the entire length of the bucket to prevent collapsing or buckling of the front end. Manganese steel chains and fittings are standard equipment and all of the teeth on these Hendrix-De Soto buckets have reversible manganese points.

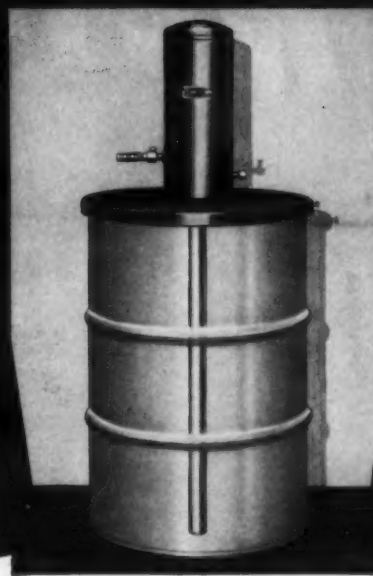
A special bulletin on Hendrix dragline buckets is available to readers of **CONTRACTORS AND ENGINEERS MONTHLY** free on request by writing to the manufacturer and mentioning this item.

FOR FIVE MACHINES OR FIVE HUNDRED— THESE ALEMITE POWER GUNS SAVE YOU MONEY ON LUBRICATION!



Model 6700 Series
Heavy Duty Barrel Pumps

Built to meet the heaviest demands of large operators. Operate direct from original 400-lb. drums; handle heavy fibrous lubricant in warm or cold weather; available for high or low pressure. Operate on 75 to 175 lbs. air; develop 600 to 7000 lbs. per sq. in. Serve several outlets. Equipped with Dyn-a-matic Primer.



Model 7200 Series
"Standard" Barrel Pumps

Admirably meet requirements of medium size fleet. Operate direct from 400-lb. or 100-lb. drums; efficient at high or low temperatures, even with heavy fibrous grease; available for high or low pressure. Capacity to serve multiple outlets. Equipped with exclusive new Dyn-a-matic Primer.



Model 7300 Series
"Master" Barrel Pumps

Ample capacity for the small operator. Operate direct from 400-lb. or 100-lb. drums; ideal for small fleet-owner or contractor. High pressure pump handles heavy fibrous grease even at freezing temperature! Bung hole or full open head models. Exclusive new Dyn-a-matic Primer insures positive prime.

CUMMER ASPHALT PLANTS

Portable Combination Hot and Cold Mix Plants

Portable Hot Mix Plants

Stationary Combination Hot and Cold Mix Plants

Cummer Combination Dryer-Coolers.

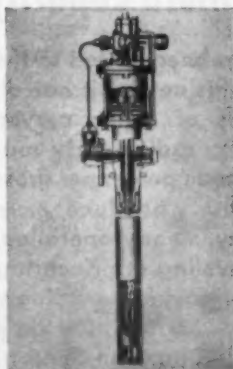
Steam Jacketed Mixers 400 to 8000 pounds capacity.

Cummer Internal Fire Dryers

Electric Batch Timers

THE F.D. CUMMER & SON CO.

Euclid and 17th, Cleveland, Ohio



ALEMITE DYN-A-MATIC
PRIMER

insures all-weather performance which you've never seen duplicated! Get all the facts NOW!

And They All Have The Exclusive NEW ALEMITE DYN-A-MATIC PRIMER!

No other grease guns can bring you the amazing efficiency and dependability of the exclusive new Alemite Dyn-a-matic Primer! This mechanically operated booster forces lubricant into the pumping mechanism—insures positive prime and freedom from air pockets—leaves nothing to chance or good luck! That's why no other pumps can duplicate Alemite performance with heavy fibrous grease at low temperatures! Or at any temperature!

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Industrial LUBRICATION

ANOTHER STEWART-WARNER PRODUCT

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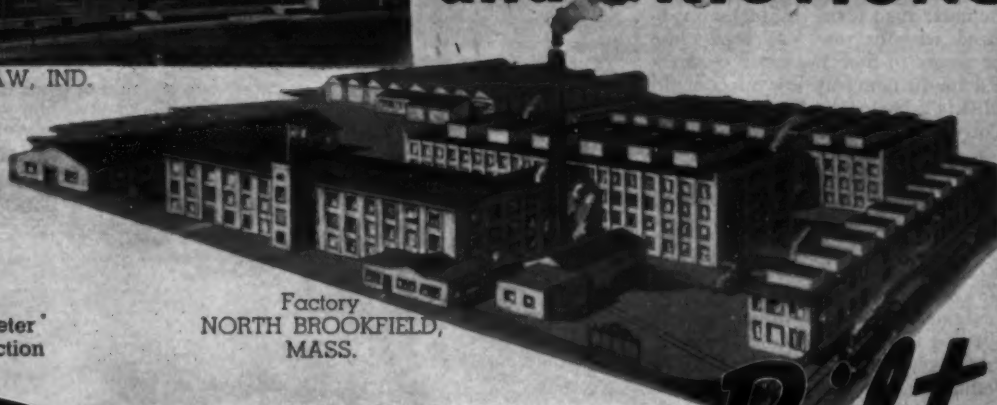
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GATKE BRAKE LINING

CLUTCH FACINGS and FRICTIONS



Factory—WARSAW, IND.



Factory
NORTH BROOKFIELD,
MASS.



30" diameter
Swing Friction

GATKE has thousands of special Moulds for making Frictions and Clutch Facings to finished dimensions in ALL shapes and sizes.



22" dia. Swing Friction



GATKE Brake Blocks and Liners, in many types, offer outstanding VALUE for every Industrial or Automotive Application.



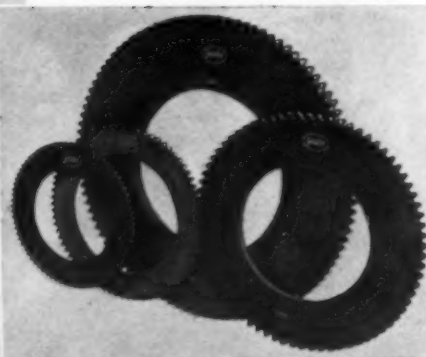
Heavy Duty Woven



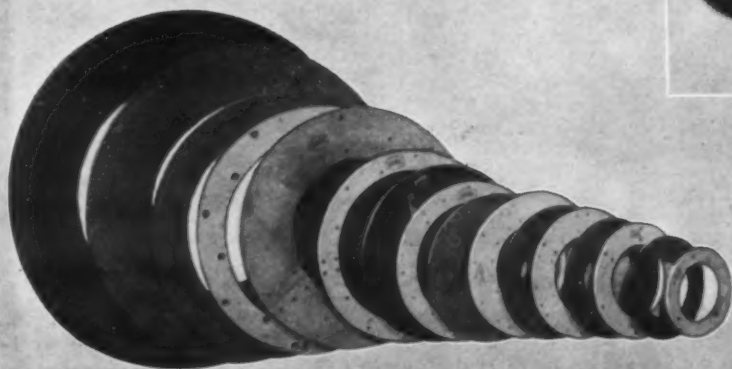
CUSTOM-BILT Brake Blocks
for Trucks, Tractors, Trailers.



GATKE Clutch Facings are made in many types for ALL requirements of Industrial Equipment, Tractors and Motor Vehicles.



Clutch Facings with
integrally moulded teeth.



Custom-Bilt

to handle any Job
with **SAFETY** and **ECONOMY**

Never before have superior Brake Lining, Clutch Facings and Frictions offered such important advantages to contractors.

Improvements in construction equipment—more compact units with greater power for bigger loads and faster operations—are imposing severe demands on starting and stopping frictions.

GATKE is prepared to meet these demands.

GATKE'S Tremendous Development Resources work the year around perfecting superior Friction Materials for every requirement.

Experience acquired in 27 years of licking tough jobs is available in their application.

Just tell us what you need or mail the coupon for information.

GATKE CORPORATION, 224 N. La Salle St., Chicago.

Please send information on—

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☐ CLUTCH FACINGS

☐ FRICTIONS

☐ FABRIC BEARINGS

Name.....

Address.....

Attention of.....

Important N. J. Road Made Into Boulevard

(Continued from page 25)

screed finisher. Just ahead of the finisher, one man was kept busy sweeping the first slab clear of any concrete spilled onto it so that the finisher would have the smooth edge of the adjacent slab for its flat wheels to run on while it was held in position by double-flange wheels on the outer road form. A Jackson rubber-tired wheelbarrow was kept close to the paver so that any extra concrete needed for bringing up low spots could be quickly wheeled back after the first pass of the finishing machine.

Hand Finishing and Curing

Hand finishing behind the Blaw-Knox double-screed machine was well taken care of by two finishers with long-handle floats and 10-foot wood drag straight-edges. Final checking of the surface before edging and broom finishing was done with a 10-foot Lakewood aluminum straight-edge. The edging was done by two hand finishers, and one man cut the joints and did the broom-finishing with a fiber broom having a 12-foot handle.

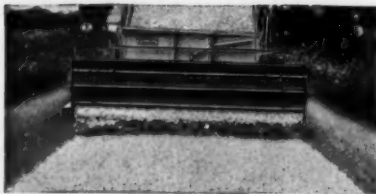
The slab was cured by spraying thoroughly with Curcrete applied as a spray direct from the drum by means of a Thompson Materials Corp. compressor and spray outfit.

Major Quantities

The major quantities involved in this \$482,103.00 grading and paving contract are as follows:

Roadway excavation.....	124,986 cu. yds.
Ditch excavation.....	1,873 " "
Borrow excavation.....	122,825 " "
Removal of concrete pavement.....	5,945 sq. yds.
Reinforced-concrete pavement, 9-inch.....	94,693 " "
Plain concrete pavement, 9-inch (at intersections).....	674 " "
Bituminous-concrete pavement (for connections).....	364 tons
Subgrade (fine grading).....	95,367 sq. yds.
Gravel shoulders 7½-inch average thickness.....	70,224 " "
Resurfacing existing gravel shoulders.....	37,735 " "
Sub-base (selected pervious material with not more than 12 per cent clay).....	35,612 cu. yds.
6-inch corrugated-metal bituminous-coated pipe with perforated ends.....	634 ft.
12-inch corrugated-metal bituminous-coated pipe with perforated ends.....	81 " "
18-inch corrugated-metal bituminous-coated pipe with perforated ends.....	60 " "
24-inch corrugated-metal bituminous-coated pipe with perforated ends.....	134 " "
30-inch corrugated-metal bituminous-coated pipe with perforated ends.....	20 " "
36-inch corrugated-metal bituminous-coated pipe with perforated ends.....	44 " "
6-inch vitrified-clay pipe.....	92 " "
8-inch vitrified-clay pipe.....	76 " "
18-inch cast-iron extra-heavy culvert pipe.....	4,808 " "

OLD ROADS MADE NEW



The BURCH FORCE FEED SPREADER will lay a perfect stone mat with its specially designed cylinder which delivers the material uniformly and eliminates all tendency to corrugations.

A du-all feed gate control allows instantaneous adjustment of the flow of material and also permits either end of the feed gate to be raised or lowered independent of the other. The machine is operated by the movement of the truck either forward or backward and is equipped with anti-friction bearings thruout.

Manufactured by

THE BURCH CORPORATION
Crestline, Ohio

Builders of Equipment for 50 Years

24-inch cast-iron extra-heavy culvert pipe.....	380 "
30-inch cast-iron extra-heavy culvert pipe.....	36 "
36-inch cast-iron extra-heavy culvert pipe.....	54 "
18-inch reinforced-concrete pipe.....	12,725 "
21-inch reinforced-concrete pipe.....	2,602 "
24-inch reinforced-concrete pipe.....	2,606 "
30-inch reinforced-concrete pipe.....	2,190 "
36-inch reinforced-concrete pipe.....	848 "
48-inch reinforced-concrete pipe.....	118 "
Inlets.....	278 units
Underdrains, Type F (French drains with 6-inch pipe at the bottom covered with 24 inches of ¾-inch stone along the shoulders).....	13,632 ft.
Sodding.....	14,455 sq. yds.
Top Soil and Seeding, Type A.....	188,026 " "
Top soil and seeding, Type B.....	62,059 " "
(These two types vary slightly depending on the time of year and weather expected during the seeding operation.)	
Cast-in-place white vertical concrete curb.....	6,106 ft.
Cast-in-place white sloping concrete curb.....	572 "
Precast reflecting white curb.....	3,229 "
2-way precast reflecting concrete curb.....	1,727 "
Reflecting white concrete vertical curb.....	2,721 "
Reflecting white concrete vertical curb, monolithic with gutter.....	265 "
Tunneling under pavement.....	1,330 "

This last item was to enable the contractor to place cross drainage pipe between catch basins without damaging

the existing 20-foot concrete pavement. The jacking was done with a 70-ton hydraulic jack, using the Armco method.

Roadside Development Items

Above we have mentioned the variation in the type of seeding to secure the best results, depending on the weather conditions, as part of the roadside-development work on this project. The contractor stripped all of the top soil from the area to be paved, using two Caterpillar D8 tractors pulling 12-yard Carryall scrapers and stockpiling the top soil at convenient points. When it came time to spread the top soil, the process was reversed and the soil spread directly from the LeTourneau scrapers in a uniform layer the full width of the scraper body.

Personnel

This contract for 6.9 miles of two 10-foot lanes of 9-inch uniform-thickness

concrete with the specified shoulders was awarded to S. J. Groves & Sons Co., of Ridgefield, N. J. Donald McKay was Superintendent for the contractor, and John Gerecke was Resident Engineer for the New Jersey State Highway Department.

Vibrators, Drills and Saws

A new folder, Form No. 212, has recently been issued by the Mall Tool Co., 7743 So. Chicago Ave., Chicago, Ill., on its line of gasoline, air and electric concrete vibrators, concrete surfacers, portable electric drills, and portable gasoline-engine, pneumatic and electric chain and circular saws. Complete information is given on each piece of equipment and there are many illustrations showing practical applications.

Copies of this folder may be obtained direct from the manufacturer by mentioning this item.



NATIONAL DEFENSE

speed-up is forcing heavier service loads for longer working periods on all types of industrial equipment. *Correct lubrication is the key to sustained top performance. For earth moving and road construction machinery there are . . .*

... SINCLAIR LUBRICANTS

designed to promote continuous operation at peak efficiency and at low lubrication costs. Sinclair's full line of oils, greases and fuels offer equipment operators maximum service under severe conditions. For quick deliveries, or for lubricating advice, call the nearest Sinclair office or write to Sinclair Refining Company, 630 Fifth Avenue, New York.

(Left) **TOURNAPULL** operated by McCarthy Improvement Co., Bloomington, Ill. Equipment Sinclair lubricated.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR LUBRICANTS-FUELS

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2540 WEST CERMAK ROAD
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FAIR BUILDING
FT. WORTH

New Spelter Coating To Bond with Paints

A new galvanized sheet, which has been subjected to chemical and metallurgical processes that change the surface finish without in any way weakening the protective spelter coating, and which furnishes an effective bond for paints, has been announced by The Newport Rolling Mill Co., Newport, Ky.

This new process, named Colorbond, provides the "tooth" which each coat of paint must have in order that succeeding coats may become an integral part of the finish rather than simply another

layer of paint. Newport reports that paint, enamel, varnish, lacquer and other finishes may be used on Colorbond with complete satisfaction. This new galvanized sheet is easily fabricated and formed without special tools and is made in three base metals, Gohi pure iron copper alloy, KCB copper steel, and Globe Brand steel, and is available in all sizes and gages.

Personnel Changes and New Dealer Announced

Henry M. Hale, Eastern Sales Manager of Caterpillar Tractor Co. at Peoria,

Ill., has announced his resignation from that office to enter into partnership with John R. Taylor as the Taylor-Hale Machinery Co., Memphis, Tenn. The company will handle Caterpillar sales and service in an extensive southern area.

George Rinck has been advanced from Assistant Eastern Sales Manager to the position left vacant by Mr. Hale's resignation, and Kenneth Cox will be the new Assistant Eastern Sales Manager.

James H. Deaderick, who has been Assistant Sales Manager of the Western Sales Division, has been appointed Assistant General Parts Manager and will have charge of all general administrative

activities in the Parts Department, as well as supervision of all Parts Depots. W. B. Gordon has been appointed Parts Manager in charge of physical inventory and its control, and A. H. Yingst, Parts Manager in charge of orders, etc.

New Buckeye Dealer

The Buckeye Traction Ditcher Co., Findlay, Ohio, announced recently the appointment of the Brandeis Machinery & Supply Co., Louisville, Ky., as distributor of Buckeye road wideners, spreaders, trenchers and R-B Finegraders in that territory.

4 Significant Jobs



Job No. 2—Helen, Ga.



Job No. 4—Kansas City, Mo.

Job No. 1
Lawrenceburg, Ky.
Not shown here.



Job No. 3—Aurora, W. Va.

IN 1940 Barber-Greene Mixers were set up for the "high type hot mixes" on four widely separated locations. They herald a new era in bituminous construction. The performance data and laboratory reports have been assembled into a booklet, available on request. Not a picture book, it gives the results of applying the modern production principle of continuous flow to the "high type hot mixes". It will answer the questions of those who are sincerely skeptical.

The B-G Central Plant includes the Dryer, Gradation Control Unit (Screen, Bins, Apron Feeder, and Calibrated Gates), and Mixer. It gives the finest means of preparing the "high type hot mixes". By "finest" we mean from every angle, including accuracy, consistency, ease of inspection, high capacity, portability, versatility, and economy.

The units can be used in any desired combination, including Single Aggregate Central Set-ups, and Travel Plant work.

It will not be surprising if the introduction of the continuous plant on "all type" mixes is opposed — by some wanting only complete proof and demonstration — by others who have financial or other interests in less portable, less versatile, or less modern equipment. We conscientiously believe that these groups will serve their own interests by studying the booklet. Already some producers have expressed interest in supplementing their present permanent equipment with a portable continuous plant, in order to more economically supply the more distant areas of their present markets.

Write for
your copy.



1-41

BARBER GREENE
AURORA ILLINOIS

Concrete Flood Wall To Protect Ironton

(Continued from page 15)

on the back and are straight on the front. On the front the assembled forms were braced with 2 x 4 and 4 x 6 sloping braces against 2 x 4 vertical studs with special bracket locks which clamped around the 2 x 4's and locked into holes in the flanges of the forms.

To furnish a working platform for the men assembling the forms and finally for the concreting, New Idea scaffold brackets made by the Ajax Building Bracket Co., and developed primarily for use on wood forms, were pinned to holes in the steel form plates and covered with 1 x 4 and 1 x 6 lumber to form a suitable and safe deck for the workmen.

Concreting the Wall Sections

The contractor planned to average one 30-foot section of wall per day and maintained this schedule very well. Variations in the operations permitted at times pouring as many as three 30-foot sections in one working day. The concrete was furnished by the Portsmouth Ready-Mix Concrete Co., of Ironton, Ohio, delivered in 1 3/4-yard Jaeger truck mixers mounted on Ford V-8 trucks.

When a section was to be poured a circular hole about 8 inches deep was dug in the roadway along the line of the wall for the 22-cubic foot Blaw-Knox roller-gate concrete bucket which was set in the ground to receive more readily the concrete direct from the truck mixer. The American crane was spotted a specified number of feet beyond the hole so that the crane men had a uni-



C. & E. M. Photo

A truck-mixer, a long-boom crane and a roller-gate bucket make an efficient combination in concreting a flood wall at Ironton, Ohio.

form swing while handling the bucket which was swung either left or right so that it always approached one of the four pouring hoppers, with their elephant-trunk chutes, from the end. Thus the six men in the concrete crew did not have to dodge a bucket traversing the full length of the scaffold each time it came up. Each 30-foot section of wall, about 15 feet high, required 40 cubic yards of concrete which was thoroughly vibrated, using Mall and Master vibrators. Usually three were carried on the scaffold when pouring a 30-foot section.

Each 30-foot section was separated by a 1/2-inch construction joint of rubberized cork. This material is remarkably resilient and, at least when new, springs back when compressed. The early sections of the concrete flood wall, built by the U. S. Engineer Department, had mastic expansion joints.

The forms remained on the concrete for 48 hours and then were stripped one section at a time beginning at the top. The concrete was thoroughly wet with

water and then immediately painted with Aquastatic Clear curing compound to cure the wall.

Personnel

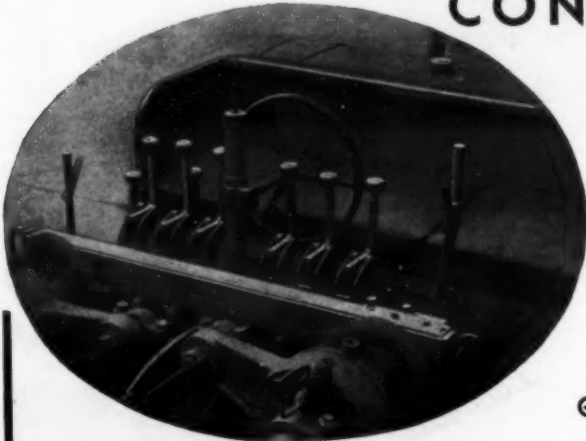
The 3,100-foot section of concrete

flood wall on the Ironton, Ohio, Flood Protection Project, was awarded to W. H. Mueller Co. of Detroit, Mich., on its low bid of \$151,000. Flore Nevejans was Superintendent for the contractor. The work was done under the direction of the U. S. Engineer Department, Cincinnati District Office, Major Fred T. Bass, District Engineer, with William J. Horrigan in charge of field inspection.

New Bits for Hard Rock

A new detachable rock bit designed for drilling unusually hard rock formation with heavy drilling equipment has been announced by The Timken Roller Bearing Co., Canton, Ohio. Although this new M Series rock bit is a heavy-duty bit, it is intermediate between the H series, which is normally used with light and medium-weight rock drills, and the heavy-duty D Series, normally used on wagon and tripod drills. As yet, the new M Series is available only in a limited range of sizes.

CENTRALIZED FINGERTIP CONTROLS



... ..
Easy Operation

Instant
Adjustment
at Touch of
a Lever

Available on
Galion 101 and 201
motor graders

Also: all-gear driven double drive; full revolving circle; wide range of adjustment; diesel or gasoline engine; box-type frame; wide front axle; leaning front wheels; and other features. Let us send you full particulars.

Also road rollers in a variety of types; pull graders; spreaders; bulldozers; grader blades; attachments.

The Galion Iron Works & Mfg. Co.

Main Office and Works: Gallion, Ohio

Galion No. 101 motor grader with diesel power and the other important features to insure the best in performance at the lowest possible cost.



Wherever you turn
SKILSAW
is on the job for
UNCLE SAM!

in building
FORT ORD
in
CALIFORNIA

Top speed is the
word... so builders of the
world's biggest defense program turn
to SKILSAW above all others
to speed up every sawing
job! That's why Fort Ord
is being built with the
help of SKILSAW...that's
why so many orders we get
call for SKILSAW in lots of 30
to 100...that's
why more SKILSAWS
are used by builders than
all other makes combin-
ed! No other saw can
give you SKILSAW'S time-
saving, cost-cutting, profit-mak-
ing features. 9 powerful
models for wood,
metal, stone
and composi-
tions.

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**SKILSAW
TOOLS**

SPEED CONSTRUCTION AND CUT COSTS



SKILSAW, INC.

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ster St., Oakland. Canadian Branch:
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...say
FORD J. TWAITS CO.
and
**MORRISON-KNUDSEN
COMPANY, INC.**
Joint Contractors





The new Burch Truk Patrol.

New Underbody Blade With Full Control

With the increasing use of motor trucks with drive on all four wheels, county highway departments are relying more and more on underbody blades for the maintenance of earth and gravel roads.

A new full-power hydraulic-controlled underbody blade known as the Burch Truk Patrol is the latest addition to the Burch line of road equipment. Features of this efficiently designed blade include the center draft bar, free movement of the blade frame to take the contour of the road, and independent pressure control for one or both ends of the blade. The front draft hitch used with the Burch Truk Patrol can also be used for mounting a front frame hitch for Ross snow plows.

Circular BTP 1, issued by the Burch Corp., Crestline, Ohio, describes this unit in full.

Engine Lubrication With Heavy-Duty Oil

A new type of engine lubricant developed to overcome piston varnishing, ring sticking, and other major lubrication troubles which have limited the power output of many heavy-duty high-speed diesel and gasoline engines has been announced by Standard Oil Co. of New Jersey. This new compounded oil, Essolube HD, has highly detergent or washing properties incorporated in a stable high-viscosity-index base oil. Both laboratory and field tests indicate, according to the producer, that in addition to inherently natural resistance to oxidation and high temperature, this oil has a high ability to wash out sludge deposits, protect bearings from corrosion, to

prevent deposits of varnish on pistons, valve stems, rings and other engine parts, as well as a valuable rust-preventive action.

This new lubricant is expected to find wide-spread use in heavy-duty high-speed gasoline and diesel engines in trucks, tractors, power shovels, draglines, and air compressors, and other construction equipment. It is in these operations particularly that stuck pistons, deposits in the piston ring zone, varnishing or lacquering on piston skirts and other parts, and sludge deposits have limited the power output and length of service between overhauls.

Essolube HD has passed the severe General Motors diesel test which calls for a 500-hour run in a General Motors high-speed diesel engine under full load and at full speed without oil change. It has also been formally approved by the Caterpillar Tractor Co. for use in its diesel engine, passing the severe 1,000-hour endurance runs in a Caterpillar engine under both laboratory and field conditions. Since the requirements of

these two engines are so different, it is pointed out that particular importance attaches to the fact that this new Essolube HD passes the requirements of both tests, as well as for use in high-speed heavy-duty gasoline engines.

A 16-page booklet with numerous

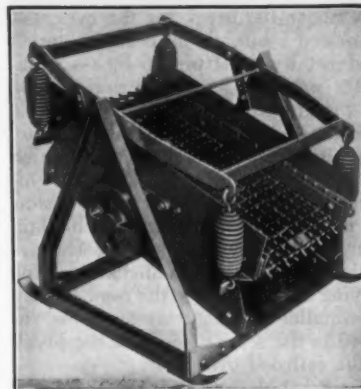
photographs of engine parts, including some in full color, and giving a complete description of the properties of Essolube HD is available from the Publications Department, Standard Oil Co. of New Jersey, 26 Broadway, New York City, to those mentioning this item.

3 Sizes, 100 Tons Per Day!

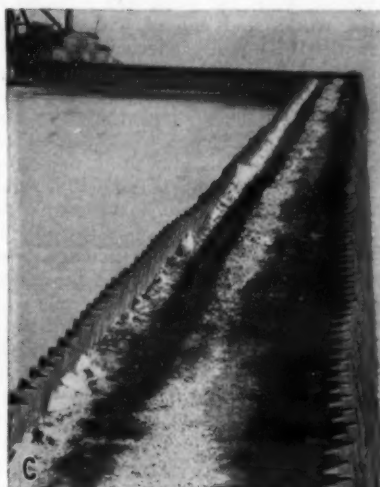
Yes, that's the capacity of this Portable Vibrating Screen and it requires the power of only a 2 hp. gas engine or 1 hp. electric motor. Easily moved. For road and construction work, concrete block making, quarries, factories, etc.

Write for Bulletin No. 110

ROBINS CONVEYING BELT CO.
PASSAIC NEW JERSEY



How to keep earth or water in its place . . . *and do it economically!*



A. Solving a Problem of lower lake levels. (Upper left) When the wooden bearing piles under their valuable Buffalo dock started to deteriorate due to exposure as the water level fell, the Spencer Kellogg Company simply surrounded their dock on the water sides with a strong wall of U.S.S. Steel Sheet "Z" Piling.

B. At Cairo, Ill. 1100 tons of U.S.S. Steel Sheet Piling in 12 to 36 ft. lengths, driven under a setback wall, reinforce and strengthen the Ohio River front protection and lower the seep line where existing levee appeared deficient in base section.

C. 600 Tons of U.S.S. Steel Sheet Piling are used in this 800 ft. pier and breakwater (upper right) to assure permanent shore protection at North Shore Park, Chicago, Ill. Thousands of tons of U.S.S. Steel Sheet Piling safeguard this Great Lakes metropolis.

D. In Far-Sighted Towns and cities in practically every riparian state on both coasts, shore lines have been protected and strengthened by breakwaters, seawalls, jetties and groins built largely or in part of U.S.S. Steel Sheet Piling.

U-S-S Steel Sheet Piling efficiently answers most problems of control and retention

IF you are designing bulkheads and retaining walls, bridge piers and abutments, piers, docks, and wharves, lock and dam walls and cut-offs, coffer dams, or other marine or foundation structures, the chances are good that U-S-S Steel Sheet Piling will do your job more effectively and economically than any other method.

This superior and versatile piling has proved itself invaluable to engineers in projects involving the retention or control of earth or water. Great strength, long life, low cost of installation and low maintenance cost make U-S-S Steel Sheet Piling ideal for such construction.

Assembled in small, easily driven units, it forms a wall that is watertight and continuous—a sturdy barrier, free from marine borer attack and attractive in appearance as well. Each unit, positively interlocked to the next, offers a guaranteed strength of from 48 to 72 tons per foot against rupture or tension.

Available in straight-web, arch-web and in the new "Z" sections, U-S-S Steel Sheet Piling is a rugged, lasting product. A finished product as shipped—ready to be handled and driven under the most difficult conditions of soil, water or surf. We welcome the opportunity of discussing its possibilities with you.



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UNITED STATES STEEL

Bituminous Macadam On New Mass. Route

(Continued from page 1)

face drainage system 1,800 feet in length was built in the northern section of this work above the break for the overpass. Perforated bituminous-coated corrugated-metal culvert pipe 6 inches in diameter was laid as a side drain along the puddingstone where considerable water showed up on the face of the ledge. This pipe leads to a drop inlet which also takes care of surface drainage. Following this is a series of catch basins and manholes with 10 to 18-inch plain concrete pipe which finally discharges beside a 30-inch reinforced-concrete pipe carrying a brook across the road. A second smaller drainage system was installed in the section south of the break for the railroad overpass.

The manholes as well as the catch basins are built of brick, are 4 feet in diameter at the bottom and taper at the top to 2-foot diameter manhole covers or gratings for the catch basins.

To take care of surface water at the bottom of 2 to 1 slopes where they join the shoulders, paved gutters are used consisting of 4-inch broken stone laid 3 feet wide and 4 inches thick with a 6-inch gravel base beneath. The broken stone was penetrated with 2½ gallons per square yard of asphalt binder and sealed with ½ gallon of the same material, using pea stone as a cover. The asphalt was applied with a hand hose from a pressure distributor.

Gravel Sub-Base

In preparation for the 30-foot paved roadway with shoulders of varied widths, ending in paved or grass gutters, depending on the nature of the work, the finished subgrade was leveled and rolled with a 12-ton Buffalo-Springfield 3-wheel roller. On this subgrade the contractor spread from 10 to 12 inches of gravel sub-base in two layers, with a maximum depth of 6 inches in any one layer. This gravel was trucked in and dumped from the tail-gates and then spread with a Galion power grader and rolled with the 12-ton roller. Traffic was permitted to use this gravel sub-base but before spreading the bottom stone the grader gave the sub-base a final grading and then it was rolled again.



C. & E. M. Photo
Spreading base stone with a Jaeger adjustable box on a section of Mass. 63 for which Kelleher Corp. was the contractor.

On fills, the gravel sub-base was carried to the outside of the slope to improve the drainage. A berm 3 feet wide consisting of 4 inches of loam is used at the edge of fills with 2-inch sod to prevent the washing of slopes. Paved spillways of a penetration macadam similar to the gutters described is used to take the water accumulated on long fills.

Bottom Course

An exceptionally good trap rock was used for the bottom stone as well as for the top stone and seal. It was furnished from the Notch Quarry of John S. Lane of Amherst, Mass. Crushed stone varying from ¾ to 2¼-inch screen size was spread in a loose layer 5½ inches thick with a Galion 10-foot spreader box. At times, when it was necessary to speed up the work, the stone was dumped by the trucks and spread with a Galion Model 101 power grader with pneumatic control. With the grader, it was possible to take care of the irregular widths and thus reduce the amount of spotting necessary at the edge. A Nickerson 10-foot spreader box was also used on bottom stone. Three hand-spotters with stone forks worked over the stone, making the course perfectly even, and two additional men worked along the edge to see that the stone spread by the boxes was uniform in thickness out to the very edge of the 30-foot roadway. The bottom course was then rolled with one of the 12-ton Buffalo-Springfield rollers to smoothness and until fully keyed. During this time low spots and high spots were carefully adjusted by the spotters so that this course was perfectly uniform to form the foundation for the top stone.

To increase the stability of this bottom course, reasonably dry sand was spilled from the tail-gates of trucks in a

thin layer and hand-broomed by a crew of eight to ten men until the voids of the bottom course were completely filled. Rolling was continued throughout this work. This is one phase of penetration macadam work which is best done in hot dry weather as practically all sand contains a considerable amount of moisture as taken from a bank pile, but when

spread on the surface of a rolled stone base and broomed continually it dries out rapidly and therefore falls more quickly and packs more readily in the voids of the base stone. Although not the usual procedure, as soon as the base course was filled with sand, traffic was permitted to use it as traffic was light.

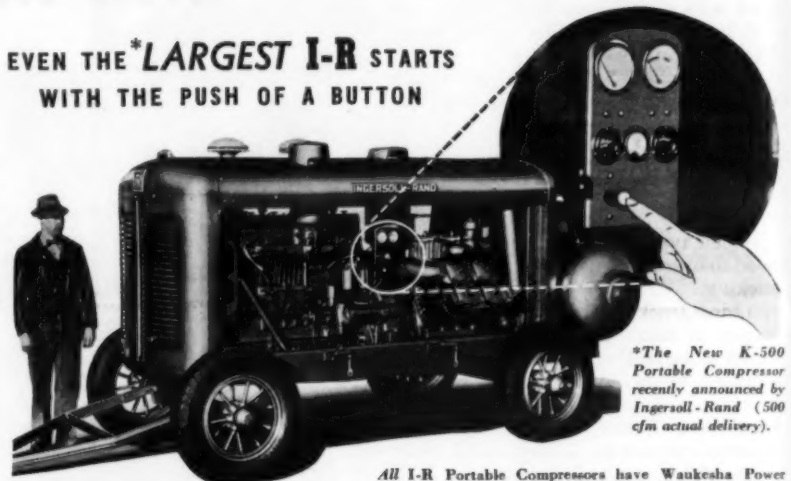
The Top Course

The top stone, a minimum of 95 per cent of which must pass a 2¼-inch sieve and not more than 15 per cent of which may pass a 1¼-inch sieve, was spread with a Jaeger adjustable spreader 10 feet in width, using two men on the box which was hitched close to the truck before the stone was dumped into the spreader box. When the dumping was complete the chain was slackened, the truck pulled up 5 feet for safety and then the men went in and unhooked the chain from the truck frame. This stone was rolled to firmness with a 12-ton roller and even more attention paid to spotting than on the bottom course. Experienced

(Concluded on next page)

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C. & E. M. Photo
Hand-spotting sand on the bottom stone on Kelleher's penetration-macadam contract in Leverett, Mass.

Mass. Road Improved; Route 63 Extended

(Continued from preceding page)

men only are used by Kelleher in this work and, in fact, Timothy Kelleher himself, acting as superintendent on the job, was practically always present to point out low or high spots to his crew.

Penetration and Seal

Asphalt for penetration and seal was delivered by the Southern Asphalt Co. in tank cars at Millers Falls, Mass., and applied by W. M. McIntosh, Inc. of Cranford, N. J., using a Hvass distributor with 15-foot spray bars. The asphalt was 85 to 100-penetration in summer and was applied at 350 degrees F at the rate of 2 gallons per square yard of road surface. As soon as the distributor had completed its application of the asphalt, the 12-ton roller made one trip over the entire surface with its three rolls wet with water to prevent picking up the stone.

Then a truck loaded with 1/2 to 3/4-inch trap-rock chips and equipped with a Burch Chip-It-Over spreader powered with a Briggs & Stratton engine was backed up to the edge of the penetrated section and its tires oiled all of the way around to eliminate picking up the stone as much as possible when the truck backed over the penetrated course spreading the trap-rock chips. The round trips of the spreader gave a very uniform covering of the surface with the chips to fill completely the surface voids. On the chip truck, three men rode on the load, first placing shovels to block the ends of the tail-board when it was swung open to feed the spreader and then they slowly

shoveled the chips down toward the spreader. Another man rode on the small platform on the spreader and another drove the truck. Following this the 12-ton roller with a drag-broom arrangement at the rear continued keying the chips into the surface during the rolling. This section of road was closed to traffic until the surface was re-rolled the following morning. Traffic quickly whipped any excess chips off to the side where they were removed by hand.

Just prior to sealing the surface the entire roadway was cleaned by hand-brooming. Sealing in Massachusetts is done at any time that is convenient as long as the surface is dry and clean when the seal is applied. The same asphalt used for penetration was used for the seal and was applied at the rate of 3/8-gallon per square yard and immediately sealed with 1/2-inch pea stone applied by the Burch spinner and rolled. The roller was equipped with a wire drag broom at the back which was let down to broom the loose stones over the surface to increase the number which would be bonded to the asphalt, creating a stone surface. The brooming was also assisted by hand-brooms to touch up edges and any places where there was a scarcity of the pea stone.

Experience has shown that the use of the spinner type of spreader, self-powered, gives much better results than any hand casting of either the keystone or the pea stone in bituminous penetration work. The mechanical distribution results in a more uniform layer and entirely eliminates the ridges which occur when inexperienced men hand-cast the stone across the road instead of along the road.

Major Quantities

Some of the major quantities involved in this contract include:

Clearing and grubbing.....	7.5 acres
Roadway earth excavation.....	34,500 cu. yds.
Ledge excavation.....	30,600 cu. yds.
Trench excavation.....	3,000 cu. yds.
Trench ledge excavation.....	300 cu. yds.
Ordinary earth borrow.....	7,000 cu. yds.
Gravel borrow.....	18,200 cu. yds.
Sand borrow for bottom course.....	1,300 cu. yds.
Fine grading of subgrade and slopes.....	97,000 sq. yds.
Crushed stone base.....	5,000 cu. yds.
Gravel surfacing for access roads.....	600 cu. yds.
Asphalt for surface treatment at overpass.....	2,100 gals.
Crushed stone for top.....	2,850 cu. yds.
Asphalt for penetration and seal.....	97,000 gals.
Catch basins.....	15
Manholes.....	8
10-inch plain concrete sewer pipe.....	800 ft.
12-inch plain concrete sewer pipe.....	1,150 ft.
15-inch plain concrete sewer pipe.....	690 ft.
18-inch plain concrete sewer pipe.....	690 ft.
12-inch reinforced-concrete pipe.....	170 ft.
15-inch reinforced-concrete pipe.....	380 ft.
18-inch reinforced-concrete pipe.....	20 ft.
24-inch reinforced-concrete pipe.....	180 ft.
30-inch reinforced-concrete pipe.....	65 ft.
10-inch bituminous-coated corrugated-metal pipe.....	210 ft.
12-inch bituminous-coated corrugated-metal pipe.....	75 ft.
15-inch bituminous-coated corrugated-metal pipe.....	70 ft.

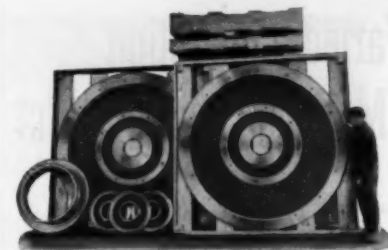
14-inch heavy cast iron pipe for use under heavy fill.....	105 ft.
14-inch extra-heavy cast iron pipe.....	110 ft.
18-inch extra-heavy cast iron pipe.....	130 ft.
6-inch perforated bituminous-coated corrugated-metal pipe side drains in place.....	100 ft.
Lawn sodding.....	580 sq. yds.
Field sodding on berms.....	600 sq. yds.
Seeding.....	19,500 sq. yds.
Loam borrow.....	3,750 cu. yds.

Personnel

This project awarded to Kelleher Corp., Turner Falls, Mass., was completed under the direction of Timothy C. Kelleher as Superintendent, with C. C. Weafer as Resident Engineer for the Massachusetts Department of Public Works, of which Raymond W. Coburn is Chief Engineer.

Dredge Pumps Reinforced Against Abrasion and Wear

The accompanying illustration shows a large shipment of Diamond Alloy dredge pump parts which recently left the Pettibone Mulliken foundry at Chicago, Ill. The shipment includes twelve sets of pump liner plates with-nose plates

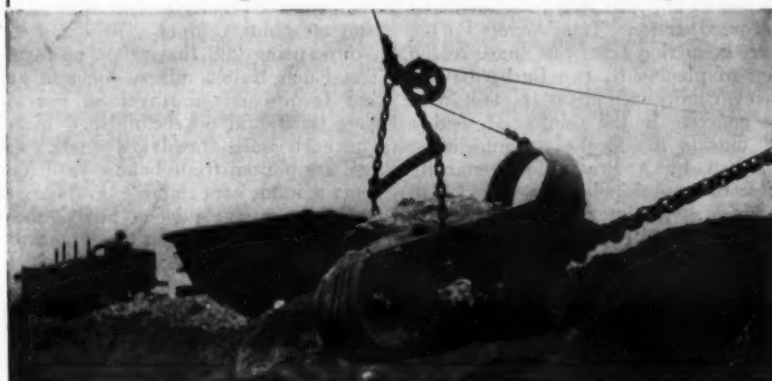


Giant dredge pump parts made of Diamond alloy.

and suction mouth pieces. This alloy, developed by Pettibone Mulliken especially for dredging service, is being used increasingly. Actual operating records show that this unusually hard metal will withstand the abrasion of sand and grit, on the average, twelve times as long as cast iron.

The importance of lubrication can not be stressed too often or too strongly. If you have any lubrication problems, write the Editor.

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Varied Concreting Methods on Aqueduct

(Continued from page 30)

way trucks and discharges through a 20 x 6-foot agitator to the No. 200 Pumpcrete which pumps to the invert form or over the top of the side-wall and arch form. The 200-foot Blaw-Knox telescoping arch forms are moved in 25-foot sections by a carriage running on a 7-foot gage track straddling the narrow-gage track. On this and on most of the other contracts, the side-wall and arch forms are held in place by bolting to inserts built into the invert.

This contractor was also awarded Contract 324 for two shafts and 7.0 miles of 15-foot tunnel, and plans to use the same methods and equipment used in Contract 307 except for the forms.

Pneumatic Placing

On several other of the Aqueduct contracts, the pneumatic method of concrete placing is being used. On Contract 318, involving 6.8 miles of 13.5-foot tunnel, Pleasantville Constructors, Inc., is now concreting the curb walls and invert and the steel-interlined and reinforced section. The concrete for the invert is carried from the mixer to the point of placing by two Barber-Greene conveyor units each about 160 feet long. The concrete in the reinforced section and outside the steel-plate interlining is blown by a Pressweld pneumatic placer through 6-inch elbows welded to the inside of the interlining.

Contract 321, for which the Frazier-Davis Construction Co., of St. Louis, Mo., is the contractor, is the only contract on the Delaware Aqueduct on which the side wall and arch are being placed before the invert. The muck track remains in place for the transportation of all side-wall, arch and invert concrete, the track being taken up just before the cleaning of the bottom and pouring the invert. The concrete curb walls in the hand-mucked trenches are built first, accurately to line and grade. The Blaw-Knox side-wall and arch forms are non-telescoping, in 30-foot sections, each section on its own carriage. The form arches, concrete-placing machine, and the traveling towers which support the two concrete blow pipes between the machine and the forms all run on broad-gage tracks straddling the muck track. The concrete for side wall and arch is mixed at the shaft head and dropped through a 10-inch pipe to a hopper and loaded into special bottom-dump 2-cubic yard buckets, three on each flat car. A crane on the concrete machine carriage lifts the buckets and moves them side-wise, when they automatically dump into the screw feeders of two 3/4-yard Hackley pneumatic concrete placers, one on each side of the carriage, from which the concrete is delivered through two 6-inch blow pipes to the top of the forms. About 150 feet of side wall and arch between vertical end bulkheads is poured each day. For the invert, rails of 6 x 4-inch steel angles with legs vertical and horizontal are being attached near the bottom of the side-wall concrete to serve as track for the Blaw-Knox invert screed and for the invert concreting unit which will include a Link Belt screw conveyor feeding a Barber-Greene belt conveyor which, in turn, will drop the concrete ahead of the 12-foot invert screed.

The Utah Construction Co. was awarded Contract 322 for the excavation and lining of Shafts 11 and 12 and 6.4 miles of 15-foot tunnel. On this contract the aggregate and cement for a 1-yard batch are weighed separately at the shaft head and, on a signal from below, dropped through separate pipes, 10-inch for the aggregate and 8-inch for the cement, to separate hoppers at the bottom of

the shaft. From the hoppers the cement and aggregate are chuted into 1-yard steel batch boxes having separate compartments for the cement and the damp aggregate. A train of five flat cars, each with three batch boxes, carries the batches to the Ransome 1-yard dual-drum paver. At the paver a gantry, with an overhead Clyde monorail and trolley the full length of the five-car trains, picks up the batch boxes one at a time, and dumps them into the paver. The gantry travels on large pneumatic-tired wheels on the curb walls. When pouring invert, the paver discharges onto a Hansen-Williamson 60-foot x 24-inch belt conveyor which drops the concrete through a chute just ahead of the invert screed. When pouring arch and side walls the mixer discharges to a Pressweld pneumatic placer which delivers the concrete through a 6-inch pipe over the top of the arch and side-wall forms. In pouring both invert and arch, the work advances toward the shaft, the mixer, gantry and other machines backing away as the work advances.

Concreting of the arch and side wall is continuous throughout a 5-day week. The steel forms, in 24-foot lengths, at the rear end are collapsed onto a carriage, moved through the forms ahead and re-erected under a clear span of the concrete chuting pipe. The contractor is now using 288 linear feet of forms. The batch trains, mixer, concrete gun and form carriage travel on narrow-gage track laid on the finished invert. The curb walls, involving small yardage, are poured from 4-cubic yard Ransome agitator cars running on the muck track, the concrete being mixed above ground. After mucking the bottom between the curb walls, the track is relaid to carry the batch trains, gantry and mixer while concreting the invert. The ties are blocked up on bags of concrete over the irregular bottom. The long belt conveyor used in pouring the invert provides space under it, between the mixer and invert screed, in which to remove this temporary track. After the invert has set, the track is relaid on the invert. No invert bridge is used.

Concrete for all purposes on Contract 306, a total of about 360,000 cubic yards, including many large gate houses and other surface structures in addition to 6.4 miles of 15 and 19.5-foot tunnel, awarded to Associated Contractors, Inc., is batched at the U. S. Transit Mix Co.'s batching plant erected expressly for this job at Shaft 18 near the middle of this contract, transit-mixed in truck mixers mounted on Mack diesel trucks, dropped down an 8-inch pipe to a hopper, and transported in Pressed Steel Car Co. agitator cars with Jaeger mixer bodies. Invert is poured from the agitator cars running on an invert bridge which runs on rails on the curb walls. The Blaw-Knox invert screed travels on the top flange of the radial invert side forms, under the bridge. For the side wall and arch the concrete agitator bodies are lifted by a Silent Hoist Winch & Crane Co. hoist on the concreting machine and discharged into the hopper of a Pressweld pneumatic placer whose blow pipe

delivers the concrete over the forms. Telescoping Blaw-Knox side-wall and arch forms 260 feet long are moved in 20-foot lengths on a carriage which, like the concrete machine and the traveling tower supporting the blow pipe, runs

on a broad-gage track straddling the concrete track.

On the J. F. Shea, Inc., and Henry J. Kaiser Contract, No. 308, for 5.3 miles of 19.5-foot tunnel, concrete is mixed

(Concluded on next page)



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The agitator cars with Jaeger 6-yard mixer bodies used by Associated Contractors.

Pneumatic Placing Of Aqueduct Concrete

(Continued from preceding page)

at the shaft head in two 2-cubic yard Koehring tilting mixers supplied by a C. S. Johnson batching plant, dropped through a 12-inch pipe to a hopper, loaded into 4-yard Chain Belt agitator cars and moved in trains of two cars. The invert is poured from the cars running on a 350-foot invert bridge reached by a ramp. This bridge runs on stringer-supported rails on bagged-concrete piers. The invert screed runs on radial invert edge forms which are attached to the invert bridge and are adjustable for line and grade. For side wall and arch, the two-car train runs up the ramp of a California switch to the deck of a traveler where the two cars discharge into two 2-yard Hackley guns so placed that each car is spotted opposite a gun. Two blow pipes, supported by an intermediate rolling tower, discharge over the 264 feet of telescoping forms. The traveler, blow-pipe tower and forms move on broad-gage track straddling the concrete track. The side wall and arch forms are moved at night in eleven 24-foot sections and concrete poured on the two other shifts, about 1,000 cubic yards being

placed per day.

The Hackley gun, designed by Roy C. Hackley of Berkeley, Calif., and used by Frazier-Davis and by Shea and Kaiser, is something of a novelty in the east but has been used for many years on important western work, including the White water tunnel of the Los Angeles Aqueduct, the Broadway vehicular

tunnel at Oakland, Calif., and at Boulder Dam.

Personnel

The Delaware Aqueduct is being built for the New York City Board of Water Supply, George J. Gillespie, President; Henry Hesterberg and Rufus E. McGahen, members. Charles M. Clark is Chief Engineer; Roger W. Armstrong, Deputy Chief Engineer; Neil C. Holdredge of the Northern Department is in charge of aqueduct construction Contracts 313 to 321 and John M. Fitzgerald, Eastern Department, in charge of the work on Contracts 322 to 324 and 306 to 308.

Bulletin on Crushing And Screening Plants

Catalog D-41-G, recently issued by Diamond Iron Works, Inc., Minneapolis, Minn., is devoted to its Rotor-Lift portable crushing and screening plants. According to the manufacturer, by the use of the Rotor-Lift a portable plant can be built considerably shorter and lower. The main-plant overall dimensions are within highway haulage limits when operating, and the dismantling of auxiliary units only is necessary for transportation. Illustrations show construction features of these plants and practical applications; typical flow charts and complete specifications are included.

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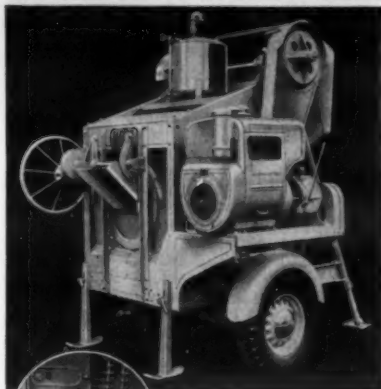
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"Snodeo" Tests Skill Of Snow Removal Crews

Second Annual Contest for County Teams, Sponsored by the Michigan Highway Dept., Was Great Success; Keweenaw County Wins

By GEORGE W. KORONSKI,
Superintendent and County Engineer,
Gogebic County, Michigan

THE second annual Michigan Snodeo sponsored by the Michigan State Highway Department, now under the direction of its new Commissioner, G. Donald Kennedy, was held on February 14, 1941, with nine teams of county workers, representing the best snow fighters in the Upper Peninsula, participating. The teams were made up of a driver and helper, and in order to be eligible to participate in this championship contest, a driver must have had an accident-free record for at least 12 months prior to the date of entry. Not more than one driver from any county may enter the contest, except the last year's champion, who defended his title in the finals.

The contest is divided into three major parts: oral interviews, operating test, and time required to perform operating test. The oral interviews are conducted by the different judges who ask the contestant questions relating to safety, winter maintenance, knowledge of and ability to check his equipment, and typical tourist information. The driver's personal attitude, appearance and general deportment are also considered. The operating test is an actual test of driving skill and general knowledge of his work, and the driver is judged chiefly on accuracy, quality of work and speed of performance.

Each team could choose any piece of equipment they desired, the equipment being furnished by the Keweenaw and Houghton County Road Commissions. In this, the visitors were at a disadvantage, for to plow snow successfully, it is a great help to have the "feel" of the truck, and the visitors had only a few moments to get acquainted with their equipment.

The Contest Is On!

Preliminary tests were held first, each team having to plow into some real drifts to show his skill. In scoring this

event, the judges took into consideration the thoroughness in plowing the road open; the thoroughness in completing the plowing and cleaning up shoulders and intersections; his observance and treatment of markers representing signs or head-wall markers, etc.; attention to safety; handling of his equipment without unnecessary abuse; and his general efficiency and courtesy.

The winners of the elimination contest then competed with the winners of last year's contest, and were defeated by this year's entry from the same county, Keweenaw County. The winning team was composed of Ralph Bammert and Richard Patsi, with Joseph Masini and Adrian Beachene of Houghton County in second place, and Raymond Sandstrom and Herman Monette of Alger County in third place. The other counties competing were Iron, Baraga, Gogebic, Menominee, Marquette and Luce.

It is reported that any county or state in the snow belt would welcome with open arms all of the men who competed in the bout, as all contestants gave an outstanding demonstration of man power and skill.

Milling With Lathes In District Garages

A milling head that can be easily and quickly attached to standard Atlas, Craftsman, Sheldon and South Bend lathes, turning the lathe into a milling machine which meets a wide range of flexible uses, will be of special interest to state and county highway shops where milling requirements do not justify the purchase of an expensive milling machine. This new Globe milling attachment, made by Globe Products Mfg. Co., 3380 Robertson Blvd., Los Angeles, Calif., uses the lathe spindle for its drive and makes use of the carriage movements to operate its table. The spindle is carried on a vertical slide so that it can be positioned or moved up and down.

Among other accessories enabling the operator to cover a wide variety of work is a ball-bearing arbor support for attachment to the lathe tailstock spindle so that a cutter arbor can be applied in a manner similar to that on a standard plain milling machine with an overarm. It is also possible to mount a chuck in raised position on the end of the arbor at the milling head and set a standard lathe tool on a block on the carriage to swing larger work in a turning opera-

tion than the lathe will take on its own headstock.

The spindle is mounted on ball bearings, is fitted with a No. 9 B. & S. taper, and is driven by V-belt sheaves and belts connecting to a sheave on the lathe spindle in an arrangement which permits vertical positioning through a 6-inch

distance above the table. The overall dimensions of the table are 4 1/4 x 12 inches.

Complete information regarding sizes and mountings as well as special adapter base plates for lathes other than those named may be secured direct from the manufacturer by mentioning this item.



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ROAD BUILDING SYSTEM

You get Operating Advantages in BLAW-KNOX BUCKETS due to better Structural Features



The rigid head in Blaw-Knox Buckets preserves fixed cable alignment between upper and lower sheaves, avoiding cable wear caused by loose or wobbly head construction.

All four corner bars are mounted directly on the head pin, thus all impact or pounding action between the head and scoop structure is transmitted directly and not through bolts or rivets.

This and many other exclusive features of Blaw-Knox Buckets are explained and illustrated in CATALOG No. 1757. Write for your copy today.

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The Jari power scythe is light enough for one man to lift over obstacles.

New Power Scythe For Roadside Work

A light-weight power-driven scythe that is built for heavy duty and especially to cut tall grass, weeds, and poplar, willow and hazel brush up to 1/2 inch in diameter is now being built by Jari Products, Inc., 2938 Pillsbury Ave., Minneapolis, Minn. This scythe has already been used successfully in Minnesota and Wisconsin by highway departments and municipalities. Because it weighs only 110 pounds, it is easily lifted over cable guard rails by one man and can be loaded and unloaded from a pick-up truck very readily.

The Jari power scythe is reported to climb slopes of 40 degrees under its own power, and is easily maneuvered around trees. The fact that it has a three-point contact with the ground permits the sickle bar to follow uneven ground at a uniform height. The 36-inch sickle bar and the V-belt drive for the single traction wheel is driven by a 3/4-hp 1-cylinder 4-cycle gas engine that requires but one pint of gasoline for cutting one acre. The machine is built to do the job of mowing and has no attachments, such as cultivators or snow plows.

Complete information regarding the operation of the machine and its economies may be secured from the manufacturer by mentioning this item.

Fitting the Engine To Your Job Quickly

The new 76-page application field book of Hercules gasoline and diesel power units recently announced by Hercules Motors Corp., Canton, Ohio, is one of the most serviceable catalogs issued for the use of contractors and highway-equipment users. It starts off with a table listing the models, dynamometer horsepower at various speeds, and the page numbers where each power unit is found described completely.

Turning to the particular engine which fills the bill according to horsepower requirements, facing pages show complete dimensions for a closed-type power unit, an open-type power unit, and a base-type power unit on the left-hand page, with complete specifications and the brake horsepower and torque curves shown on a chart. At the bottom of the right-hand page are the suggested maximum working loads for the particular model for intermittent service and for continuous service at various engine speeds. Throughout the book, facing pages give similar information for each of the models of Hercules gas and diesel engines, with complete summaries of the specifications of all of the gasoline and of the diesel power units.

Closing the catalog are the details of accessories, such as starters, mufflers, tachometer drives, fuel pumps, clutch power take-offs, and reduction gears to fit these engines to any power problems within their power ranges.

Houck Works Tractors On Grade and for Power

We have had many stories on the ingenuity of Roy L. Houck, highway and grading contractor of Salem, Ore., who knows how to get the last ounce of productivity out of every piece of his equipment. One of the latest stories about Mr. Houck has to do with providing a full time job for his tractors.

On any highway grading job there comes a time when the earth-moving equipment is laid off and therefore many of the tractors are out of a job. When Houck reaches this point and his contract includes surfacing of the new grade he sets up his rock crusher to furnish the material. Providing power for a crusher is usually a choice of high-line current or a portable power plant belted directly to the machinery. Houck prefers electric motors to run his plant but at the same time he wants to use his own diesel power units. He does this simply by taking the required number of his idle diesel tractors from the job, connects them up with generators through the rear power take-off, and he has all the electric current he needs.

From an investment standpoint he then has an all-round 100 per cent usable unit capable of performing most services at the least cost. When the electrical-power needs come to an end, the generators are removed and the tractors are put back to their former routine.

The crushing and screening plant, shown in the illustration, and driven by electric power furnished by diesel tractor-driven generators, was used during the summer to produce 80,000 cubic yards of surfacing material for 6.3 miles of new road on U. S. 99 south of Siskiyou Summit, near the Oregon-California line.

A Lubrication Pump With Greater Power

Four new lines of lubrication equipment covering extremes of performance and of price classes, and designed to meet all requirements from that of the smallest service installation to the largest garage demand, have been announced by the Alemite Division, Stewart-Warner Corp., 1850 Diversey Parkway, Chicago, Ill.

One of these lines is being introduced as the DeLuxe Line; the second will be known as the DeLuxe Line; next in price will be the Master Line; and as a general but complete set-up for the contractor or highway garage whose requirements do not necessitate the use of the more powerful pumps, the Advance Line has been developed.

Three mechanical features which make the new Alemite equipment of interest to the construction field are the Dynamic Primer, which provides positive priming even with the heaviest lubricants; the Aldura air valve, which is described as a completely enclosed leak-proof and durable valve of the sliding type; and the Hose Miser, which automatically releases the pressure in the grease hose when the air line is disconnected, thus saving strain and making coiling easier.

In addition to the four new lines for automotive service establishments, there



On a 6.3-mile highway project on U. S. 99 in Oregon, Roy L. Houck, contractor of Salem, Ore., used his three Caterpillar diesel tractors to power his crushing and screening plant, after they had completed their service in the heavy grading operations. Above is the plant and at the left, the three diesels powering electric generators which in turn ran the plant.

are new industrial pumps for use in plants or for portable service stations for use by contractors, and in community and highway garage operation.

Throughout the four lines the performance ability of the pumps is stressed by the manufacturer, especially the ability of the new pumps to deliver heavy lubricants in a volume in excess of equipment formerly available. This is accomplished by larger and more powerful pumping mechanisms. A feature of the Advance Line is the interchangeable power-head which makes it possible to operate with one air motor any number of pumps which a contractor or highway garage might have. The air motor represents a substantial proportion of the purchase price of a pump. By using the interchangeable head on more than one piece of equipment, this additional cost is saved on all subsequent pumps purchased.

Catalogs of the new Alemite line-up are available from the manufacturer by mentioning this announcement.

Large-Capacity Excavator Described in Bulletin

The standard P & H Model 955 excavator, made by the Harnischfeger Corp., Milwaukee, Wis., is built entirely of rolled high-tensile steels, well-welded, and is diesel powered, with electricity as alternative equipment. It is available as a 2 1/2-yard shovel, a 3-yard dragline, a 3-yard clamshell, or a crawler crane. There is also a long-range model capable of handling a 3-yard dragline bucket on a 110-foot boom, or a 4-yard clamshell bucket. This model is equipped with extra-long crawlers and wide shoes for maximum stability and low ground pressure.

Details of the machine and of its mechanism are described and illustrated in Bulletin X-21-1, copies of which may be obtained from the manufacturer.

Ackerman Promoted at Dodge

The appointment of J. R. Ackerman as Director of Merchandising and Advertising, Dodge Division, Chrysler Corp., Detroit, Mich., has just been announced. Mr. Ackerman has been asso-

ciated with Dodge for several years, recently as Assistant Director of Truck Merchandising at the factory in Detroit.

Complete information regarding this machine may be secured from the manufacturer by mentioning this item.

ONAN Electric Plants Dependable—Reliable Alternating or Direct Current

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Emergency Standby
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MODELS—350 to 50,000 Watts
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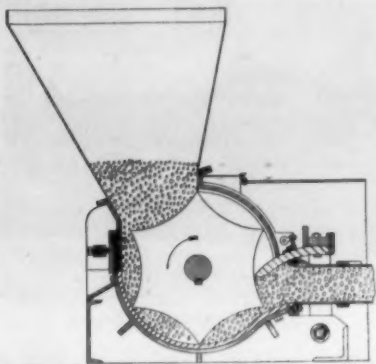


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629 West Washington Blvd., Dept. A-70, Chicago, Illinois



Method of operation of the Rotogate concrete pump.

Small Concrete Pump Made in Three Sizes

A new rotary concrete pump has recently been announced by Rotogate Pump Corp., 600 South Michigan Ave., Chicago, Ill., for placing concrete and other semi-fluid materials. It has only two moving parts in contact with the material, a pocketed rotor and a gate or cleaning device. In operation, the concrete or other material to be handled is placed in the hopper where it is picked up by the pockets in the rotor, carried through the pump casing, and then forced out through the discharge throat by the gate, where it is carried by a pipe line to its final destination in the forms. Discharge is reported to be positive and continuous, whether the rotor turns at one revolution per hour or ten per minute, its capacity being the same for each revolution.

One of these pumps, with a capacity of 40 cubic yards per hour, has been built for use on a Chicago tunnel job at 83rd and Stewart Streets. It is available, however, in three sizes, 20, 40, and 60 cubic yards per hour, mounted on skids or wheels and supplied with a gasoline engine as standard equipment. An electric motor or a diesel engine is also available. The Rotogate pipe, either straight or curved, in 6, 8, or 10-inch sizes, is equipped with quick-coupling joints.

Complete information on this new concrete-placing unit may be secured from the manufacturer by mentioning this item.

Well Drill Holes For Bigger Blasts

Where heavy ledge is to be removed, it is becoming increasingly realized that well drill holes provide economical results in drilling costs and rock per pound of dynamite. The Loomis Clipper drill, manufactured by the Loomis Machine Co., Tiffin, Ohio, is made in either gear or friction pull and is a one-man machine. It is built with an all-steel electric-welded frame in either crawler or wheel mounting, or the frame may be carried on a 1½ or 2-ton truck. The friction-pull machine has an asbestos-lined brake, and the direct gear-pull machine has an asbestos-lined brake and clutch and is operated by one lever.

The machine is built to give strokes of four lengths, a long stroke of 35 to 37 inches, a medium stroke of 30 to 32 inches, an intermediate stroke of 22 to 24 inches, and a short stroke of 13 to 15 inches for self pumping and jetting. An

exclusive feature of the K-4 Loomis Clipper is the adjustable sliding pitman top which permits very small alterations of the stroke, in character as well as in length. The speed of the drop may be increased or decreased by moving the pitman back and forth, thus altering the basic character of the stroke.

Full details on the Loomis K-4 Clipper drill will be found in a 6-page folder which is free on request.

Cord Conveyor Belts

The new 12-page booklet on cord conveyor belt, recently issued by the B. F. Goodrich Co., Akron, Ohio, is graphically illustrated with pictures showing construction details and varied types of operation. Describing how the same principle of cord construction used in present-day automobile tires to make possible high mileages was made practical by the development of field splicing and vulcanizing, the booklet relates in non-technical language the methods of manufacturing the new type conveyor belt. Subjects discussed include cover adhesion, flexibility, mildew resistance, freedom from stretch, vulcanized and metal splices, and engineering advantages. The method to be used in estimating the number of plies needed in the conveyor belt under different operating conditions is given, as well as service conditions for which the belt is particularly adapted.

Convertible Shovel

Bulletin 16-10 has recently been published by the Buckeye Traction Ditcher Co., Findlay, Ohio, covering its Model 70 ¾-yard Clipper convertible shovel. Full specifications are given and the ease of convertibility to dragline, crane and trench hoe is illustrated.

Copies of this bulletin may be obtained direct from the manufacturer on request.

New Catalog on Lathes

The South Bend Lathe Works, South Bend, Ind., has recently issued a new general catalog covering its lathes. The catalog has 112 pages, contains over 240 illustrations, and shows 50 different sizes and types of South Bend back-gear screw-cutting lathes for manufacturing, tool room and general shop work. Each size is shown in several different models

with motor drive and counter shaft drive, in quick-change and standard-change gear.

New items included in the catalog are the Model A 9-inch workshop tool room lathe; the 10-inch swing 11/16-inch Collet Series S lathes; and the 10-inch swing 1-inch Collet lathes. Copies of this catalog will be mailed on request to any reader mentioning CONTRACTORS AND ENGINEERS MONTHLY.



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Even the most confirmed skeptic must admit that when two surfaces do not touch there can be no wear. That is why LUBRIPLATE Lubricants impart indefinite life to shafts, bearings and gears. LUBRIPLATE has qualities not possessed by conventional lubricants. Its separating

film is tougher, able to sustain greater loads, more water resisting, steam resisting and completely resists rust and corrosion. Extremely economical . . . it lasts longer. Cleaner . . . most LUBRIPLATE products are white in color.

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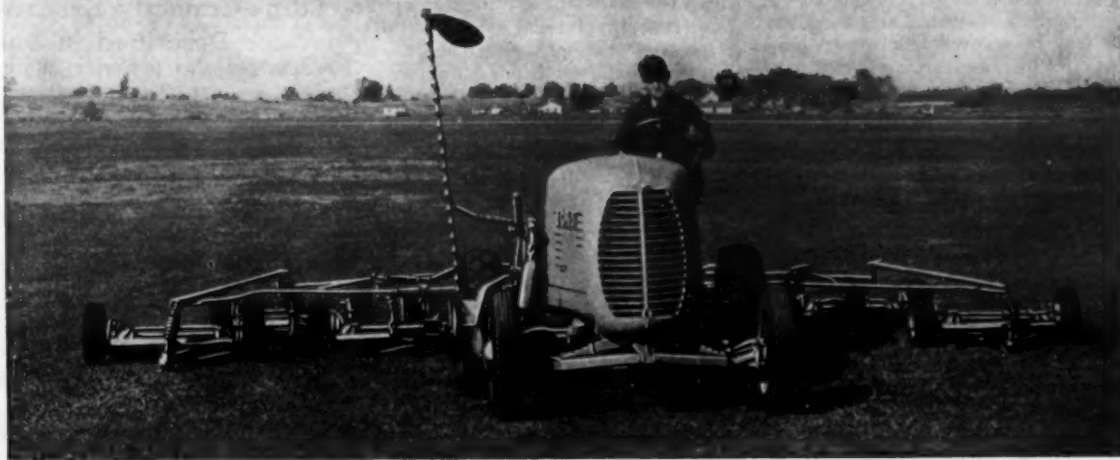
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If you cut 75 acres or more of grass, this is the perfect outfit.

For heavy duty air-field cutting, you can't beat Toro Mowing Machinery.

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Dependable Products Since 1873
LOCKLAND CINCINNATI OHIO

Send for
BEAUTIFULLY
ILLUSTRATED
24 PAGE CATALOG

Grading and Fill On Maryland Route

(Continued from page 27)

30-cubic yard Carryalls and two 18-yard Carryalls, hauled by Caterpillar RD8 tractors, were used on the short hauls, averaging 800 feet, and four Euclids loaded by an Austin-Western elevating grader made the long hauls, which averaged 2,500 feet.

Allis-Chalmers gasoline tractors and Caterpillar diesels, equipped with LaPlant-Choate bulldozers, were used for spreading the dirt in 8-inch layers and performed very efficiently. These types of equipment were used on all of the contracts.

The only rock encountered on the highway was in the stream relocation at Mill Creek, Principio Creek and Broad Creek and two hog-backs of granite on Contract H-218. In the stream changes the rock was drilled by Ingersoll-Rand wagon drills, shot and removed by Owen buckets on Lorain cranes. On H-218, the drilling was done by an Ingersoll-Rand wagon drill and jackhammers operated from a Schramm compressor. The rock, of which there was 15,000 cubic yards in the two hog-backs, was very difficult to remove, but it was loaded by a gas shovel and an old Erie steam shovel.

Fill Problems

Contract Ce-215 was the fill approach to the Elk River Bridge between Chesapeake City Road and the east bank of the river. This area was an old swamp which had been filled from 10 to 20 feet deep with refuse from an old pulp mill. Investigations were made to determine if the material could be displaced with dynamite to permit the new fill to reach stable ground. It was discovered that the mill waste did not contain sufficient water to propagate the shots. Further, it was very light and powdery, weighing approximately 50 pounds per cubic foot, and when shot simply blew up a little cloud of dust and was less stable than before shooting. Load tests were then made on the area and it was decided that there was sufficient bearing value to warrant placing the approach fill upon it. Careful inspection was made during the formation of the embankment to discover any evidence of displacement of the existing ground. No rise in the elevation of existing ground at the toe of slopes was apparent during construction and there is none now. There was a maximum 8-inch settlement of the fill upon its completion. This settlement was corrected by the addition of 12 inches of fill, leaving the grade 4 inches high. Check levels have been run at intervals since the placing of the additional fill in December, 1939, and no movement has been noted.

In the various swamp areas crossed by the highway, all A-8 soil was removed to expose a suitable bearing soil and the backfill to grade was made with selected material. In one swamp area on Contract Ce-209, dynamite was used to liquefy the swamp muck which was then displaced to the outside edges by the placement of the fill directly following the shooting. The fill was carried forward in an inverted V. The requirement of 8-inch layers for the formation of embankments was waived, it being necessary to have the volume of fill placed of greater weight than the mud in order to displace it.

On Contracts H-218, Ce-214, Ce-222 and Ce-185, a density requirement was stipulated for compaction of fills. On the remaining contracts, compaction was secured by using sheepfoot rollers. The density requirement for fills under 10 feet was 95 per cent and for 10 feet or over, 90 per cent of their dry weight



Grading operations on the C. J. Langenfelder & Sons Contract Ce-222.

per foot. Excavated material was required to have a weight of 100 pounds per cubic foot in order to be used in the fills. There was no requirement as to moisture content of the material. It was found that the grading equipment would secure these densities without using rollers if the moisture content was within 2 or 3 per cent of the optimum. The extremely wet spring and summer kept the material considerably above the optimum and so considerable blading to aerate the top layers was

necessary to reduce the moisture.

Subdrainage

On Ce-209, a grading and drainage contract from Foy's Hill to Northeast, considerable difficulties were encountered in a cut section near the west end of the project. The cut was approximately 20 feet deep and the subgrade was clay, with an overburden of about 8 feet of sand of exceptionally small gradation with approximately 20 per cent of silt. This sand stratum was

covered by a 10 to 12-foot layer of coarse sand gravel, highly pervious. Ground water in the gravel entered the sand and made it liquid, causing a slow flow of the sand to the roadway and undermining of the gravel, with slides as the result. Underdrains were constructed along the slope at the junction of the gravel with the sand, paralleling the roadway, and were also constructed down the slope at right angles to the roadway, outletting into a second underdrain at the toe of the slope adjacent to the roadway. Though this construction stopped the slides temporarily, inspection of the underdrains shows that the fine sand is being carried in sufficient quantities by the ground water to have partially filled the drains and outlets at such a rate that the drains will require a costly cleaning operation at too early a date.

A discussion of the paving operations on this relocation project in Maryland will be published in the next issue of this magazine.

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7-S or 10-S

Spring-mounted axle — Roller bearing auto type wheels — Greaseite low pressure pneumatic tires — Automatic skip vibrator — Enclosed gear reduction — Multiple V-belt drive — Vertical syphon-type tank.

BUILT TO "TAKE IT" — either on the job or traveling between jobs. Compact. Lightweight. Roller bearings throughout. Also 4 wheel end or side discharge models. Other sizes 2½-S to 112-S. Write for literature.

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MIXER MANUFACTURERS FOR MORE THAN 40 YEARS

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FOUR WHEEL END DISCHARGE

2-wheel trailability plus 4-wheel truck stability.

TOWS EASILY behind Car or Truck!

Here's a lightweight mixer that gives you all the speed you want — to the job or on the job. Compact 5 ft. wheel-base, automotive steering, spring mounting, pneumatic-tired wheels and balanced weight permit high towing speeds. Engine mounted on curb side of mixer. Low overall width. No overhang on traffic side. Works in narrow places. Other sizes 2½-S to 112-S. Write for bulletin.

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Powerful, smooth-operating Heil Dig-N-Carry Scoops cut dirt-moving costs to the bone.

You push even the tough jobs through on schedule — and make money

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Heil equipment helps you make even the toughest jobs pay out in profits. For in the complete Heil Road Machinery line you have the right units to do the work right . . . to help assure you of clean-cut, on-time jobs that bring other work your way. Famous Heil advantages — such as fast loading and dumping, accurate cutting and spreading, short turning radius, and easy hitching and unhitching — bring you real savings in time and service expense. Equip yourself for profitable operation with Heil Dig-N-Carry Scoops, Trailbuilders, and Bulldozers. Write today for free catalog.

Left: Heil Hydraulic Dump Units are sturdy . . . fast . . . dependable.

Tractor owned by Shafer Construction Co., Madison, Minn., has dual hook-up for operating either a Heil Hydraulic Scoop or a Heil Trailbuilder.

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HEIL Quality Products

Cable Scoops — Hydraulic Scoops — Motor Scoops — Trailer Scoops — Bulldozers — Trailbuilders — Tamping Rollers — Hydraulic Dump Units

Strategic Highways Need Modernization

(Continued from page 17)

lem and should be financed nationally, assisted by the states through participation in the planning, programming and engineering activities necessary, which item of expense would necessarily be one of patriotic duty."

G. T. McCoy, Assistant State Highway Engineer of California says, "California is most willing to cooperate with the Federal Government in bringing these highways (the strategic network) to the standards specified by the War Department. However, the Federal Government has made no provision for Federal assistance to the states to meet the increased demands. Present Federal-Aid funds are entirely inadequate for the need, and the use of these funds in their entirety for defense road purposes will largely cripple progress at congested locations not on the strategic system. It would seem that in a program involv-

ing the construction of a network of highways of strategic military importance and the accompanying access roads, a proper and just basis of cooperation between the Federal Government and the states should involve an equitable distribution of the financial burden."

That most of the states are willing to bear their share of the burden, insofar as possible, is evidenced by this statement from E. B. Lockridge, Chief Engineer of the State Highway Commission of Indiana. "My attitude on financing strategic highways is as follows: on state highways that are rebuilt specifically to serve defense projects and industries and which would not normally need to be built to serve the public, I believe there should be a special Federal grant; but on highways that are important to national defense and are at the same time a part of our program, I believe such projects should be financed with Federal Aid and state funds on pavements and bridges and with WPA funds on widening and structure extensions."

In reply to a question on this matter of financing needed defense-highway work, Wilson T. Ballard, Chief Engineer

of the Maryland State Roads Commission, replied, "The work of modernization of the highway system is being carried on at present by means of regularly programmed projects, many of which are included in the strategic network of roads as outlined by the War Department through the Public Roads Administration. To bring the entire strategic network up to requirements outlined to this Commission during the past summer will require the reconstruction of approximately 653 miles of highways, including bridges, at an estimated cost of approximately \$66,000,000. To carry out this work without interference with the normal maintenance of the existing state system or with the regularly programmed additions and betterments to the state system, based on starting the work at the present time, completion within any reasonable time contemplated by the present emergency would require very substantial appropriations for the purpose. At the time of submit-

ting the estimates in August, 1940, it appeared advisable to suggest that these funds come from special Federal appropriations."

Texas Highway Department officials have pointed out that if the Department concentrates on military roads, the entire highway system will be paralyzed and the normal road program halted. The Commission adopted a resolution last October pledging full cooperation with the Federal Government in the construction and maintenance of state highways of strategic military importance, but pointed out that additional funds are necessary if the improvement of military network is to be speeded, as is essential. The Commission expressed willingness to match Federal funds as required to facilitate the construction of regular state highways included in the strategic network. It urged, however, that Congress provide additional appropriations from national de-

(Concluded on next page)

Status of Strategic Network of Highways

State	State Hwy. Mileage	Strategic Network Mileage	Strategic Hwy. Mileage Below Standard	No. of Bridges Below Standard on Strategic Network	Estimated Cost To Bring Highways Up to Standard	Estimated Cost To Bring Bridges Up to Standard
Alabama	6,500	1,200	1,135	133	\$ 33,536,300	\$ 4,407,700
Arizona	3,615	1,763	1,457	153	19,600,000	2,500,000
Arkansas	9,190	1,000	1,000	0	0	0
California	13,865	5,595	2,000	653	150,000,000 ¹	1,110,100
Colorado	12,354	1,000	926	225	14,619,220	3,110,100
Connecticut	2,800	500	500	0	21,000,000 ²	0
Delaware	3,918	16	16	0	992,000	0
Florida	7,556	2,118	0	0	61,215,900 ³	6,876,500
Georgia	11,908	1,205	1,205	17	15,458,900 ⁴	1,736,700 ⁵
Idaho	4,778	931	325	3	2,973,500	193,000
Illinois	11,200	1,300	1,300	0	0	0
Indiana	9,878	1,300	1,300	0	0	0
Iowa	8,540	1,300	1,300	0	0	0
Kansas	9,856	1,300	1,300	0	0	0
Kentucky	9,216	1,300	1,300	0	0	0
Louisiana	19,021	1,300	1,300	0	0	0
Maine	2,076	480	480	0	0	0
Maryland	4,214	653	653	0	0	0
Massachusetts	1,904	1,023	500	11	34,988,000	1,646,000
Michigan	9,333	2,256	439	22	18,023,500	1,186,800
Minnesota	11,287	2,104	1,424	182	41,738,400	21,634,000
Mississippi	6,500	967	302	42	9,203,900	4,930,000
Missouri	15,800	1,918	1,740	80	42,340,700	1,385,500
Montana	2,688	2,688	0	144	83,425,100	3,634,600
Nebraska	11,248	810	810	0	14,000,000	0
Nevada	5,203	1,469	667	34	11,807,800	650,000
New Hampshire	3,535	809	797	29	27,824,500	1,309,000
New Jersey	5,116	761 ⁶	130 ⁶	29 ¹¹	2,551,000 ^{10, 12}	1,273,200 ¹¹
New Mexico	12,291	1,177	1,121	178	13,000,000	800,000
New York	14,043	3,260	2,940	60	49,000,000	3,900,000
North Carolina	10,400	1,344	1,344	49	1,938,000	1,865,000
North Dakota	7,342	985	985	0	20,611,600	0
Ohio	18,565	1,313	808	40	21,817,500	2,716,000
Oklahoma	8,197	0	0	0	0	0
Oregon	7,106	0	0	0	0	0
Pennsylvania	40,500	0	0	0	0	0
Rhode Island	1,206	76	30	6 ¹⁴	2,417,010	4,653,600
South Carolina	9,630	1,351	696	55	2,320,600	1,957,500
South Dakota	6,000	1,139	1,159 ¹⁵	3 ¹⁶	15,854,429	10,328,700 ¹⁷
Tennessee	7,500	1,090	1,090	0	27,324,500	0
Texas	22,567	6,575	0	0	80,000,000	0
Utah	5,160	1,300	1,200	64	19,591,000	1,235,000
Vermont	1,750	835	789	21	19,679,170	2,946,000
Virginia	9,500	1,739	356	32	12,083,167 ¹⁸	1,724,500 ¹⁹
Washington	5,983	2,402	2,089	96	20,445,000	2,110,000
West Virginia	32,900	397	397	10	12,789,700	338,000
Wisconsin	10,000	1,374	1,105	6	13,000,000 ²⁰	2,500,000
Wyoming	3,954	1,909	1,544	24	13,815,600	353,900

¹Included in estimate for strategic highways.

²In addition, \$13,000,000 needed for construction of access roads.

³No report received.

⁴Includes right-of-way costs.

⁵Exclusive of right-of-way costs.

⁶Exclusive of right-of-way costs amounting to \$18,243,500.

⁷Only \$7,572,900 needed immediately for 432 miles of highway construction, and \$791,700 for bridges.

⁸Includes needed construction of parking shoulders; of the 1,300 miles, 40 per cent requires parking shoulder construction only.

⁹In addition, there are 96 miles on the strategic network which are not a part of the state highway system.

¹⁰Plus 32 miles on strategic network but not in state highway system, to cost \$1,260,700.

¹¹Plus 9 to 13 bridges on strategic network but not in state highway system, to cost \$632,900.

¹²In addition, \$849,700 is needed for work on state highways considered of strategic importance by the state highway department but not designated by the War Department, and \$463,000 for work on important routes not in the state highway system.

¹³All 1,244 miles need parking shoulders, but only 144 miles lack standard pavement.

¹⁴Need 1 new bridge; estimated cost \$800,000.

¹⁵Total mileage meets military requirements for width but lacks standard shoulders.

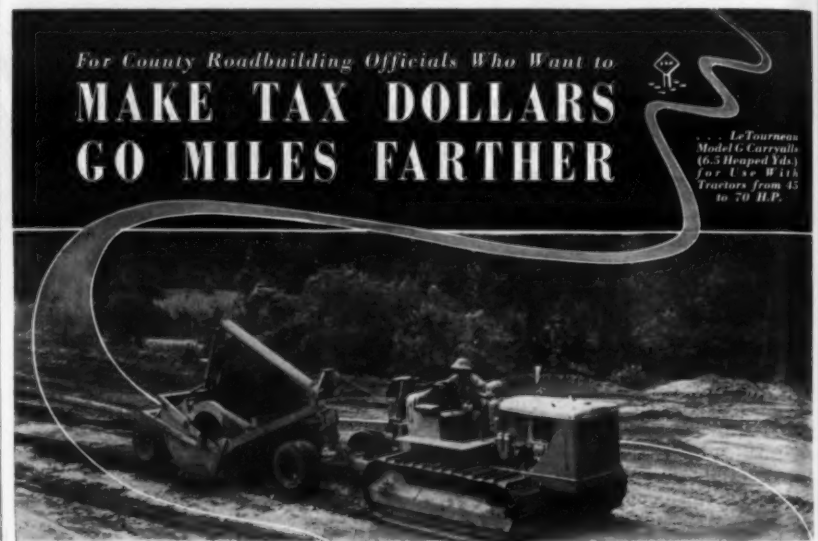
¹⁶Only one bridge lacks adequate strength; others inadequate in width.

¹⁷Plus 3 underpasses to cost \$180,000 and 7 overpasses to cost \$414,200.

¹⁸To bring up to minimum War Department standards; to bring up to Virginia Department of Highways minimum standards, cost for highways would be \$17,631,135 and for bridges, \$2,940,500.

¹⁹Work needed: relocation, 227 miles; roadway widening, 48 miles; improvement of sight distance, 65 miles; shoulder improvement, 27 miles; drainage improvement, 13 miles; surface widening, 93 miles; surface reconstruction, 206 miles.

²⁰Exclusive of right-of-way costs, estimated at \$1,500,000.



Model G Carryall, working behind new D7 "Caterpillar" tractor, gets a heaping load of Alabama clay, to widen a road in Dale County. The eight-foot cutting edge on the Model G applies greater drawbar pull per lineal foot of blade, makes for easier loading, helps get heaping loads fast.

BUILT especially for you county roadbuilders who want cost-cutting Carryall performance in an economy size Scraper, the LeTourneau Model G offers you every big Carryall advantage . . . is a complete one-machine roadbuilding department in itself.

No Spreading Tools Needed

For one thing, you get the same positive ejection tailgate action found in the larger, more expensive Carryalls. By this forceful dumping method, the Model G spreads any material the tractor can load . . . shale rock, mud or ordinary dirt . . . in even layers. Thus, special spreading equipment is eliminated.

Like all Carryalls, the Model G combines the three earthmoving jobs of load, haul and spread into one continuous operating cycle.

Handles Finishing, Too

On bank sloping, ditching and other clean-up work, the Model G offers addi-

tional savings. For instance: With wheels set within Carryall cutting width, you can cut flush with vertical banks and along fence lines . . . produce clean-cut "V"-shaped or box-like drainage ditches.

This inset wheel feature enables Carryall tires to compact material as it is spread . . . helps build more solid fills. For surfacing . . . here's an effective, low-cost way to gravel your roads. So you can add road maintenance to the savings this economical construction unit offers you.

Now is the time to put this Model G Carryall to work like so many other counties are doing . . . now, when Spring thaws are beginning to bog down your community's roads. Don't wait another day. Call your nearest LeTourneau "Caterpillar" dealer for a demonstration . . . on your own roads . . . NOW!

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PEORIA, ILLINOIS • STOCKTON, CALIFORNIA



AN OWEN GRAPPLE will furnish THE SOLUTION

SPECIAL jobs often require special tools and while rock handling problems are doubtless common to many, OWEN has perfected and proved the special tool for this job in the Type RA Rock Grapple. Revolutionary, independent tine action, enormous lifting capacity and other exclusive features distinguish it decidedly from other equipment intended for like use.

Write for the new catalog, just off the press.

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Federal Funds Needed For Vital Road Work

(Continued from preceding page)

fense funds for purely military access roads into and out of training areas and bases and also for additional costs to bring the strategic network included in the regular state highway system up to the required minimum standards.

PRA Recommendations

In his report to the President on highways for national defense, Federal Works Administrator John Carmody recommended an immediate appropriation of \$287,000,000 for urgent defense-highway work. This report, prepared by the Public Roads Administration at the request of the President, divides the general defense road program into two parts: 1. those roads primarily required for defense operations to be financed entirely with Federal funds; and 2. improvement of the strategic highway system to be financed jointly by the Federal Government and the states, with liberalized Federal participation.

Of the recommended immediate appropriation of \$287,000,000, \$150,000,000 would be for access roads, \$25,000,000 for tactical roads, \$100,000,000 for the strategic highway system, and \$12,000,000 for advanced planning for future development of the strategic highway system. According to these recommendations, the access and tactical roads would be financed entirely by the Federal Government; the cost of work on the strategic network would be shared by the states, with larger Federal participation than on the present Federal-Aid basis; and the strategic network planning would be financed by the Federal Government and the states on a 50-50 basis.

The approximate apportionment of the \$100,000,000 recommended in the Defense Highway Report for improvement to the strategic network in the various states follows:

State	Recommendation for Strategic Network
Alabama	2,080,245
Arizona	1,435,382
Arkansas	1,707,928
California	3,982,125
Colorado	1,798,524
Connecticut	630,997
Delaware	487,500
Florida	1,425,748
Georgia	2,519,366
Illinois	1,235,985
Indiana	3,954,419
Iowa	2,415,900
Kansas	2,595,523
Kentucky	1,840,894
Louisiana	1,467,188
Maine	866,500
Maryland	833,715
Massachusetts	1,311,369
Michigan	3,028,316
Minnesota	2,709,402
Mississippi	1,773,232
Missouri	2,967,206
Montana	2,018,907
Nebraska	1,991,356
Nevada	1,374,718
New Hampshire	487,500
New Jersey	1,274,429
New Mexico	1,620,981
New York	4,824,597
North Carolina	2,378,838
North Dakota	1,504,377
Ohio	3,576,168
Oklahoma	2,271,217
Oregon	1,647,906
Pennsylvania	4,995,568
Rhode Island	487,500
South Carolina	1,341,640
South Dakota	1,583,613
Tennessee	2,114,507
Texas	6,294,440
Utah	1,123,714
Vermont	487,500
Virginia	1,844,069
Washington	1,580,939
West Virginia	1,095,332
Wisconsin	2,406,404
Wyoming	1,246,353
Yukon	487,500
Dist. of Col.	487,500
Puerto Rico	495,603
Total	\$100,000,000

The states will contribute funds to this work but the exact basis is not yet determined, possibly 40-60 or 30-70.

The report also recommends the following supplementary legislation by amendment of the existing Federal Highway Act:

1. Authorize additions to the Federal-Aid system of any roads conforming to the main lines of the strategic network as designated by the War and Navy De-

partments.

2. Make roads and bridges on auxiliary lines of the network eligible for improvement with Federal-Aid secondary roads funds.

3. Permit the use of Federal-Aid funds in payment of part of the cost of acquiring necessary rights-of-way and attendant property damage.

Ready to Go to It

In our article on National Defense in the January issue of CONTRACTORS AND ENGINEERS MONTHLY, we pointed out that the road builders of America and the manufacturers of road-building equipment are equipped and ready to embark on a greatly increased road and bridge construction program.

Our recent survey among state highway departments indicates that plans for needed highway and bridge work are ready and waiting only for the necessary funds. When these are available, work can start at once. This survey indicated that, with only one or two exceptions, there are sufficient local contractors in each state to handle the immediate urgent work, once the money is made available.

The construction industry is ready and anxious to make its contribution to national defense. So let's go to it!

Tunnel Ventilation

With Steel Air Tube

A ventilating pipe for use in tunnels, which is permanently air-tight against both positive and negative pressures and yet is extremely flexible, has been developed by Lock Joint Pipe Co., Ampere, N. J. Lock Joint ventilating pipe is made of steel, has air-tight self-centering joints for easy assembly, and provides a smooth even interior with reduced joint spaces which cut the friction losses and pumping costs.

This steel ventilating pipe is made in sizes from 18 to 30 inches in diameter, and over 185,000 feet have been made and sold in the past 2½ years. It has been used on the Delaware Aqueduct of the New York City water supply by Walsh Construction Co., Frazier-Davis Construction Co., Associated Contractors, Inc., S. A. Healy Co., and Seaboard Construction Corp.

Full information and prices on this new steel ventilating pipe may be secured from Lock Joint Pipe Co. by referring to this item.

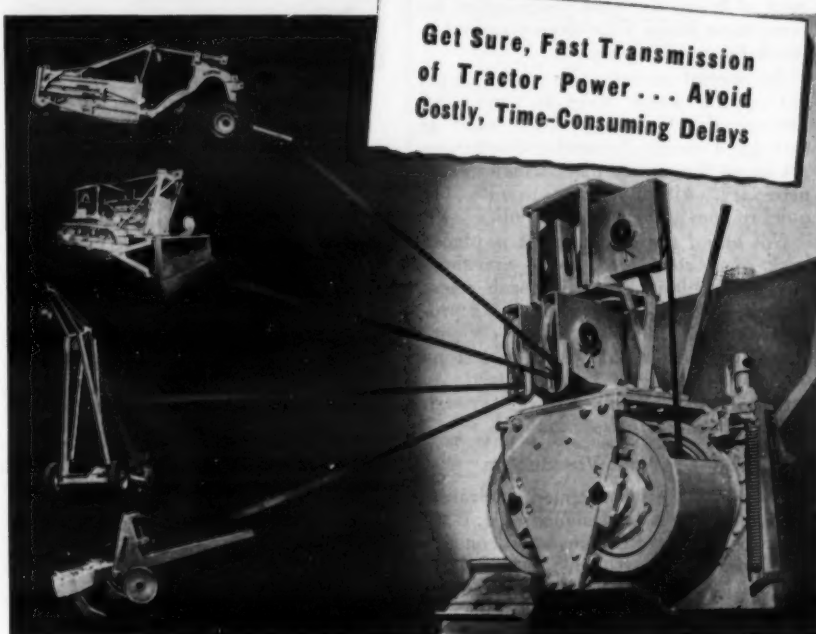
New Large-Size Crusher

Due to the success of the 18-inch Tel-smith Intercone crusher during the past several years, the Smith Engineering Works, 532 E. Capitol Drive, Milwaukee, Wis., decided to increase its line of reduction crushers by adding a larger

size. Tel-smith now has a 28-inch Intercone crusher for the gravel producer whose demands call for larger volume capacity but who must keep the initial investment at the minimum.

A full descriptive bulletin of this machine may be obtained on request direct from the manufacturer.

For Profit-Making Steady Work USE LeTOURNEAU POWER CONTROL UNITS



Feb. 14, 1941, Le Tourneau built its 15,000th Power Control Unit. That is more than all other makes combined. It's definite assurance to you that when you buy a LeTourneau Power Control Unit, you get a unit job proved by thousands of users the world over... a unit you can depend on to give you fast, positive service with a minimum of trouble... a unit enabling you to move big yardages fast. These 15,000 Power Control Units indicate, too, an overwhelming preference on the part of successful earthmovers for LeTourneau cable con-

trol. They prefer it because it puts money in their pockets.

For profitable operation insist on Le-Tourneau Power Control Units. Their main features are patented, available in no other unit. They're adaptable to all makes of track-type tractors for operating Carryall Scrapers, 'Dozers, Rooters, Cranes, and other cable-controlled tools. Ask your LeTourneau-"Caterpillar" dealer to install them on your tractors NOW.

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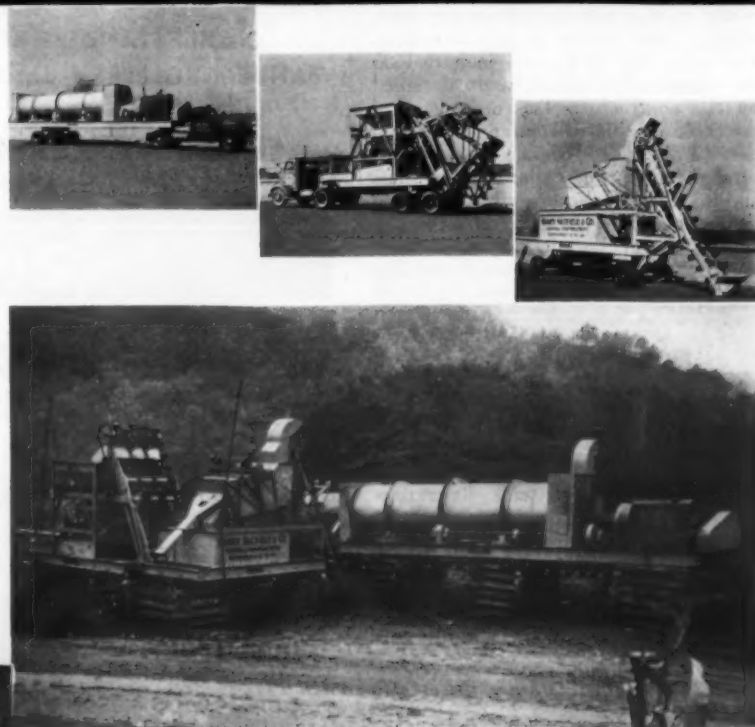
ASPHALT MIXING PLANTS

Portability and large capacity go hand in hand in the new Model M-H Bituminous Batch Mix plant. Three wheel mounted units, two of which may be hauled by any standard tractor—are easily moved and set up on small tonnage jobs. Ample capacity is provided by full size 2500# pug mill mixer. Will meet most State and Federal specifications for standard bituminous mixes.

Stationary and gravity type portable plants are also available in batch capacities of 300# to 8000#.

Further details upon request.

HETHERINGTON & BERNER INC.
ENGINEERS AND MANUFACTURERS
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Hydraulic Fill Used For Oregon Highway

(Continued from page 7)

constructed under previous contracts. The hydraulically placed embankment is carried up from this on a 3:1 slope to profile grade, and on the land side on a 6:1 slope down to ground surface. When the fill is completed to the level of the toe, a sand dike is built, using a Northwest 70 shovel rigged as a dragline, with a 3-yard scraper bucket. When the dike is up, the sand is pumped in back of it until the dike level is reached, and a similar dike is made back of it and the work continued as before, there being four steps required to reach the profile grade.

No special means are required to get rid of the water since it drains off through the Columbia River sand as through a sieve. A crawler tractor can get in on the newly placed material, if necessary, within a few minutes, so quickly does the water drain off.

Not all of the embankment is placed back of a rock toe. There are three sections of about 2,000 feet each where there is no current action to make a protective toe wall necessary. Here the contractor will simply construct a 6:1 slope of sand, erecting a wooden trestle to carry the pipe line, discharging through bleeder traps in the bottom.

The Dredge Washington

The electrically operated hydraulic dredge Washington, designed by J. B. C. Lockwood, dredge designer and consulting engineer of Portland, was especially equipped for this job. A new General Electric 2,500-hp synchronous-type motor and a specially designed pump were installed. The large motor operates the pump while a smaller one of 200 hp operates the digger.

Current for the dredge is supplied by the Northwestern Electric Co. by an unusual combination of land and water facilities. They tapped their 66,000-volt line on the Washington side of the river, put in a temporary substation and reduced the voltage to 11,000. A three-phase line was then run down to the river and connected with a supply line carried on piles in the river, roughly approximating the course to be followed by the dredge. A 3,000-foot three-conductor armored submarine cable nearly 4 inches in diameter then carries the current to a floating substation on a barge moored to the dredge.

One end of the cable is connected directly to the pile-carried supply line, without intervention of any switching. The other end terminates in a reel on the barge which was cleverly designed by the contractor. The inner end of the cable on this reel is fanned out and the individual conductors carried through a bearing collar on the shaft and to three collector rings mounted through heavy insulators on an extension of the reel shaft. Brushes collect the three-phase current from these rings and it is then passed through oil circuit



The driving end of the submarine cable reel. This cable, carrying 11,000 volts, permits current to be brought to the floating substation.

breakers to three 1,000-kva transformers on the barge where it is stepped down to 2,400 volts for operation of the two large motors. Smaller transformers furnish current at 110 volts for lighting, the operation of small motors, etc.

The handling of the 11,000-volt current through slip rings was questioned, but this method is safe in this case because the rings are stationary when the heavy current is being delivered to the pump motors. The only time the rings revolve is when the reel is winding up cable or paying out on a move, and the pump is never operating at that time.

The maximum pumping distance to be encountered is approximately 7,000 feet and the lift from the river bed is

60 feet. With such a distance and such a lift, and with a 22-inch pipe line, it can be readily understood why such a large motor is required. The utility company has figured out that approximately 10,000,000 kilowatt-hours of electrical energy will be required to complete the job.

As the dredge works its way along the channel, the cable is paid out. Then when the dredge is moved back to start excavating the other half of the channel, the cable is reeled in. This cable reel is wound up by means of gears at one end operated by a chain drive from a small automobile gasoline engine, permanently mounted. A brake drum and brake band are also arranged so that the reel will not get out of control.

The fixed pipe line and the line from that to the dredge are laid on pontoons. The shore line is laid on top of the fill, the lengths of pipe being handled quickly by a small Caterpillar tractor.

A maximum of 1,000 cubic yards of material can be excavated per hour by this dredge which is operated in three shifts.

The Abrasion Problem

Columbia River sand is well known for its highly abrasive quality. While hydraulic dredging has been going on there for years, nobody has been able to get away from the spectre of Old Man Wear, as there seems to be not a particle of silt in the sand to act as a lubricant.

The General Construction Co., as have others before it, has found that abrasion has to be reckoned with constantly, not only in the case of the steel pipe but also in the pump lining and impellers. Sections of pipe have to be taken out and patches welded over the parts which are worn through. This is

done on shore.

A pump lining is good for only one week, in spite of the fact that it is made of a special extremely hard alloy steel 1½ inches thick. Once a week the lining must be built up with hard surfacing material by electric welding, meaning a 24-hour shut-down of the pump. Similarly, the impellers will run only a week before requiring repair. In this case, however, two sets can be employed alternately, so that one set can be repaired while the other is in operation.

Personnel

This dredging contract and all other highway work mentioned are projects of the Oregon State Highway Commission, of which R. H. Baldock is Chief Engineer. E. A. Collier, Division Engineer, located in Portland, is in direct charge of this work.

For the General Construction Co., H. A. Dick, Vice President, has been active on this work, with J. C. Greeley in charge of dredging operations. J. A. Bowers is Field Superintendent.

For Steady, LOW-COST Drilling!



"DIXON"

WASHER TYPE

AIR HAMMER COUPLING

"DIXON" Air Hammer Couplings meet every condition of service on hand hammer and rock drill operations with maximum economy and reliability. Simple construction, yet exceptionally strong and durable to withstand incessant vibration and rough usage. Cadmium plated—rustproof. Coupling complete consists of male or female spud, stem, wing nut, clamp and washer.

Compact Type, Style WLD-7, ½" and ¾". Heavy Type, Style WHD-9, ¾" and 1".



"GJ-DIXON"

GROUND JOINT

AIR HAMMER COUPLING

Same as above, except washerless. Instead of a washer, a copper insert in spud (male or female, as specified) fits accurately against rounded head of steel stem, forming soft-to-hard metal seal that remains leak-proof, regardless of wear or the presence of sand, grit or other abrasive particles. No washers to wear out or be mislaid. Cadmium plated—rustproof.

Compact Type, Style XLD-41, ½" and ¾". Heavy Type, Style XHD-52, ¾" and 1".

On your next order, be sure to specify "DIXON" or "GJ-DIXON" Air Hammer Couplings. Your rubber manufacturer or jobber stocks them for immediate delivery.

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Write for Literature, Prices, etc., on new 1941 models

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Directory of EQUIPMENT DISTRIBUTORS

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of various lines handled.

GARLINGHOUSE BROS.

2416 E. 16th St. Los Angeles, Calif.

Southern California Distributors for

BROWNING—Truck Cranes, Shovels, Locomotive Cranes

DEMSTER—Dumpsters

DIAMOND IRON WORKS—Crushers, Portable Gravel

DAVEY—Compressors

LAMBERT-NATIONAL—Hoists and Cableways

McKERNAN-TERRY CORP.—Pile Drivers

A. LESCHEN & SONS—Wire Rope

NOVO—Engines, Pumps, etc.

OMAHA—Dragline Buckets

OWEN—Clamshell Buckets

RANSOME—Concrete Mixers, Pavers, etc.

UNIVERSAL—Panel Formers, Form Cams, etc.

Manufacturers of

GAR-BRO—Concrete Carts, Wheelbarrows, Concrete Hoppers, Buckets, etc.

GAR-BRO—Dragway Attachment for Draglines

EDWARD R. BACON CO.

Folsom at 17th St.

San Francisco, Calif.

Aerall Emulsion Distrib.

Allis-Chalmers Tractors

American Concrete Grinders

Barber-Greene Tractors

Brooks Load Luggers

Byers Shovels, Cranes

Carson Bit Grinders

Cleveland Trenchers

Dobbie Derricks, Piling

Erie Rollers

Gar-Bro Barrows, Carts

Hercules Chip Spreaders

Hercules Power Units

Huber Rollers

Interstate Tramways

Jackson Concrete Vibrators

Jager Mixers, Pumps

Johns, Paving Equip.

Jones Saw Benches

Kiesler Clamshell Buckets

Kohler Lighting Plants

Littelford Wheelbarrows

McKernan-Terry Pile Drivers

Marion Shovels, Cranes

Neelson Bucket Loaders

Ohio Locomotive Cranes

Page Dragline Buckets

Porta Conveyors

Ramsay Winches

Rogers Bros. Trailers

Schramm Air Compressors

Symons Cone Crushers, Vibrating Screens

Ther' Air Tools

Taylor Torches

Ward Piers

Winslow Scales

Member: Associated Equipment Distributors

NORRIS K. DAVIS, INC.

400 Seventh St. San Francisco, Calif.

Representing

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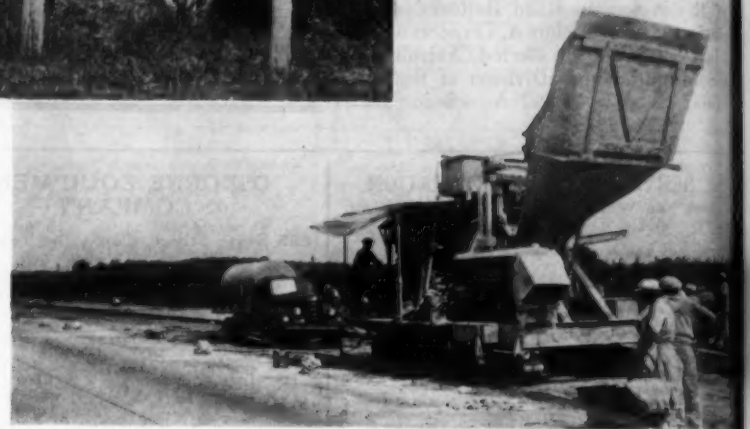
C. & E. M. Photo

The Spirit of 1940-1941, marching toward better highways, as expressed by a group of workers on the Kelleher Corp. contract for 2.14 miles of bituminous penetration macadam on a new section of Massachusetts Route 63 through Leverett. See page 1.



On its contract for 6.98 miles of crete pavement to double the capacity of New Jersey Route 63, J. Groves & Sons Co. used a Mack dual-drum paver, water for which supplied by two 1,000-gallon trucks. One of these trucks is being towed by the paver. See page 2.

C. & E. M. Photos



H. A. Dick, Vice President of General Construction Co., and J. C. Greeley, in charge of dredging operations, with hydraulic all being placed on an Oregon State Highway Commission project on the Columbia River Highway. At left the fixed pipe line laid on pontoons. See page 7.



Concreting invert on Contract 323 on the Delaware Aqueduct, for which the Seaboard Construction Co. is the Contractor. The concrete which has been chuted from agitator cars running on the traveling bridge overhead is being spread and shaped by a Blaw-Knox invert screed pulled forward by the cable.



Frazier-Davis Construction Co.'s concreting machine on Contract 321 of Delaware Aqueduct. The specially designed concrete bucket is dumped by one of the two Mackley guns mounted one on each side. See page 2.